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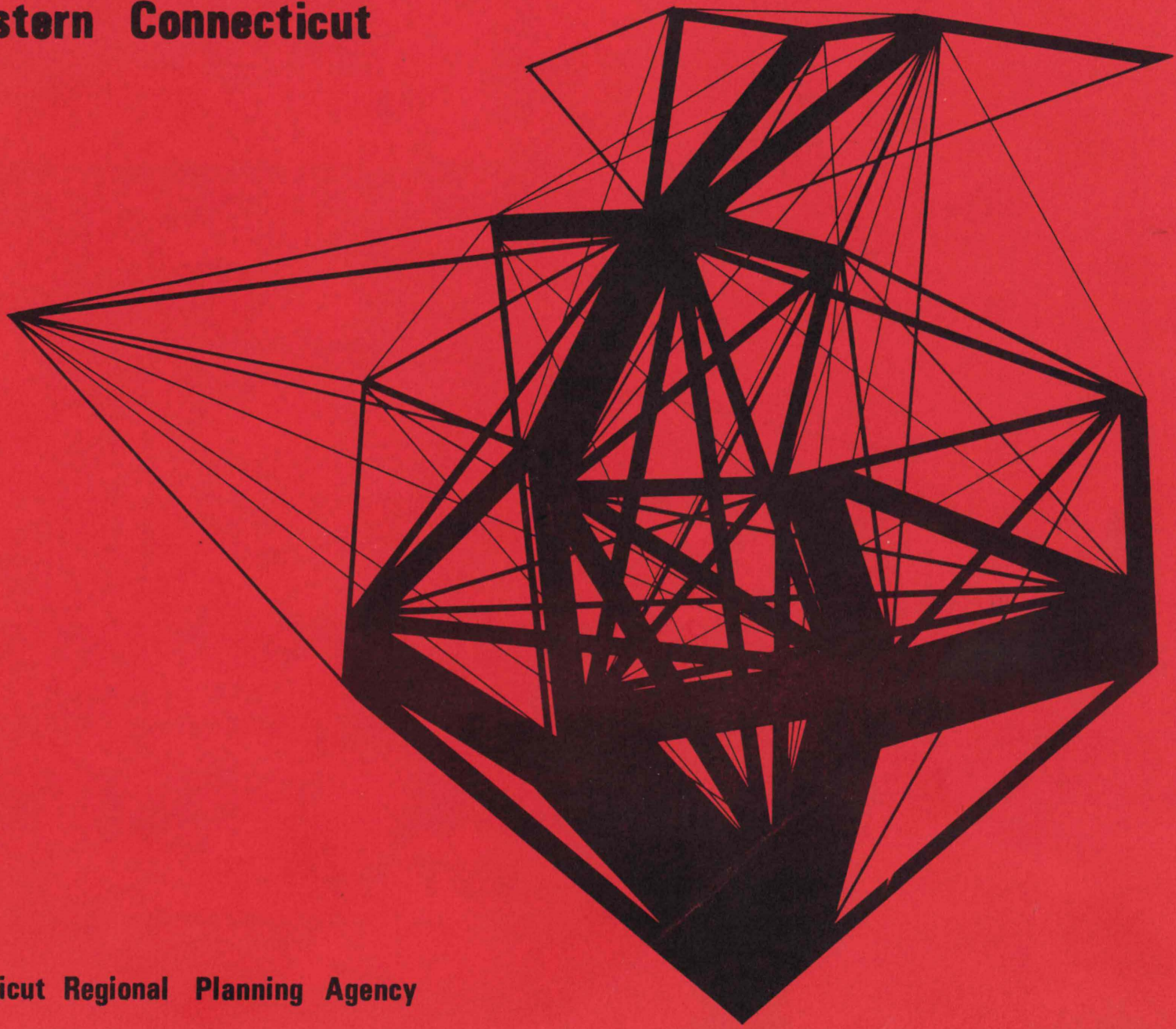

Southeastern Connecticut Regional Planning Agency

RECOMMENDED REGIONAL TRANSPORTATION PLAN FOR SOUTHEASTERN CONNECTICUT

Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration, and the Connecticut Department of Transportation. The opinions, findings, and conclusions expressed in this publication are those of the staff of the Southeastern Connecticut Regional Planning Agency and do not necessarily reflect the official views or policies of the Connecticut Department of Transportation and/or the Federal Highway Administration.

SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY
139 Boswell Avenue, Norwich, Connecticut 06360

December, 1975

ABSTRACT OF REPORT

1. Title: *Recommended Regional Transportation Plan for Southeastern Connecticut.*

2. Author: Transportation Planning Staff of the Southeastern Connecticut Regional Planning Agency, 139 Boswell Avenue, Norwich, Connecticut 06360.

3. Subject: A study of the transportation facilities and needs of the Southeastern Connecticut Region.

4. Date: December, 1975.

5. Name of Agency: Southeastern Connecticut Regional Planning Agency.

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8. Abstract:

The report summarizes the existing status of and organization for transportation planning in the Southeastern Connecticut Region; presents land use, economic, demographic and related data on the region; presents data on maps, charts and tables regarding the region's travel characteristics; and evaluates the adequacy of existing transportation facilities to meet expected future travel demands. Specific project improvements relating to all modes of transportation are included in the report.

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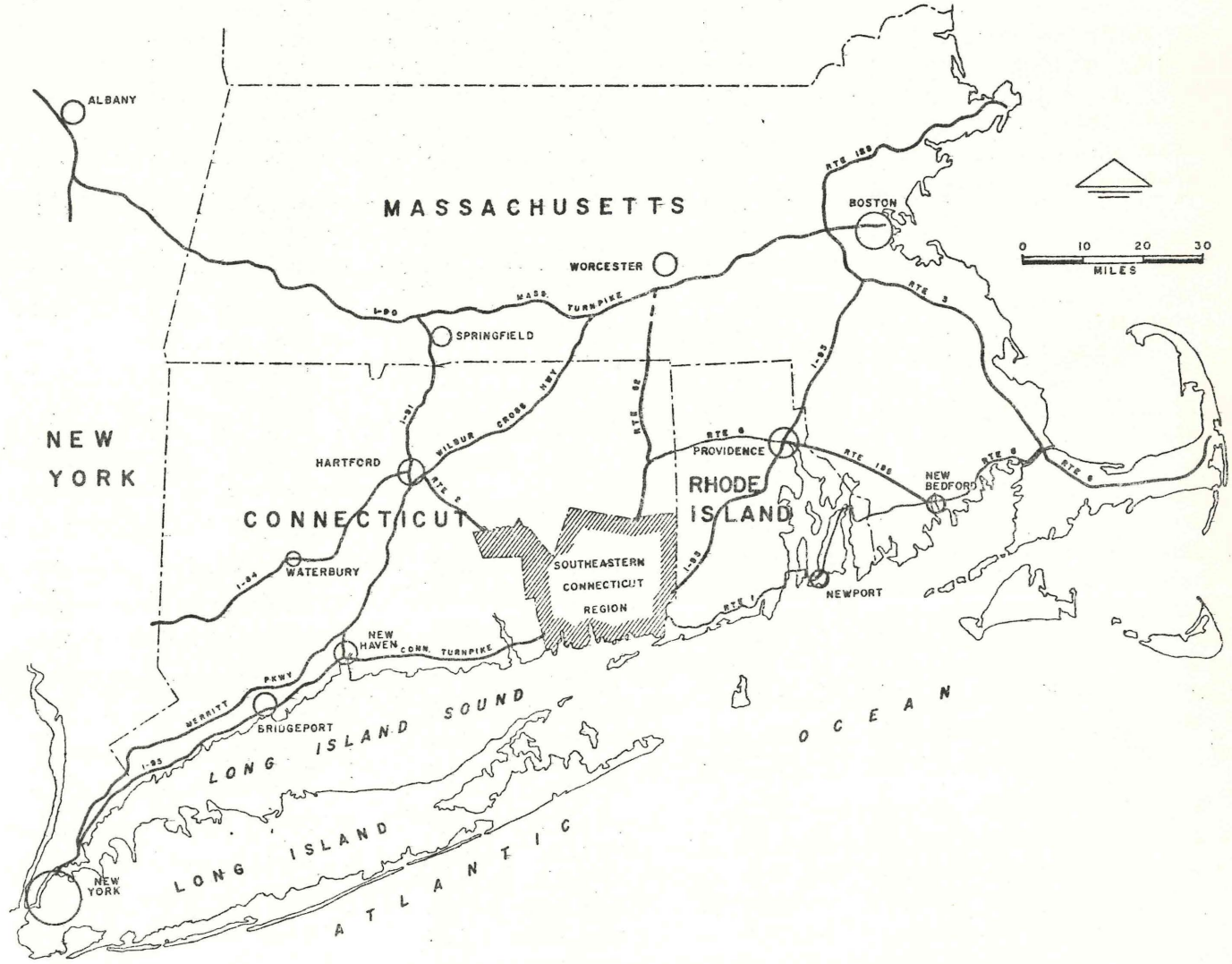
SOUTHEASTERN CONNECTICUT REGION



LOCATIONAL MAP

FIGURE 1

SCRPA 1975

I. INTRODUCTION

The mobility of persons and goods is a prerequisite for greater economic productivity and serves as the catalyst which encourages urban development. Continued urban growth emphasizes the need for objective and rational approaches to urban transportation planning in order to maintain and improve mobility.

Since the turn of the century, transportation patterns have changed from a great dependence on public transportation to an "auto oriented" system, or highway system. Increased dependence on automobiles and trucks has led to a shift of population from urban to suburban areas. In turn, the spread of residential population into areas of low density has increased travelers' dependency on personal transport.

Urban transportation demands are a composite of individual trip patterns. If the total daily travel were distributed evenly during the day and throughout the system, there would be no transportation problem. It is the concentration of this travel, first, during certain hours of the day and, second, in certain corridors of the region or areas of the city that contributes to the congestion. The challenge of transportation planning is to provide sufficient transportation system capacity, balanced among all modes, to meet future travel demands.

The rising concern of the public for air quality and the economic impact of the Arab oil embargo of 1973-74 brought about an awareness of the need to reassess the direction of transportation planning. The goals of transportation are now stated in terms of a system which provides a balance between public and private transportation modes. A further specification is to select a system which provides a level of service acceptable to the public and their ability to pay and which conforms to the region's environmental standards.

The regional transportation system should be an integral part of the comprehensive plan of regional growth. Because of the interaction of transportation and land use plans, there is a need for coordinated planning in order to bring about a desired development.

Aesthetic values should be important considerations in facility development. The transportation facilities should be designed in harmony with and adapted to the scale and structure of the surrounding environment.

Transportation and land use planning cannot be considered as two separate functions. If maximum benefit to the communities is to be achieved, the two concepts must be developed cooperatively, and in a coordinated fashion that results in each complementing the other.

This report is a draft prepared by the SCRPA staff. It will be distributed widely for review and comment. In the spring of 1976 it will be considered for adoption by the Southeastern Connecticut Transportation Planning Policy Board.

II. THE PLANNING STRUCTURE

A. ORGANIZATION

Transportation planning in Southeastern Connecticut is intended to reflect the concerns of individuals and agencies at all governmental levels. It is a process of developing and monitoring transportation plans and transportation improvement programs which are formulated with due consideration of their probable social, economic, environmental, and energy conservation effects and the safety and mobility needs of the population of the region. The planning process necessarily involves many local, state and federal agencies. It must be flexible in order to reflect changing attitudes, social and economic priorities, and technological innovations. To meet these varied requirements, the process must be fully coordinated, comprehensive and continuing.

1. Policy Board

The agency responsible for transportation planning in this region is the Southeastern Connecticut Transportation Planning Policy Board. Formed in March, 1974, in accordance with the terms of a "Memorandum of Understanding for Transportation Planning in the Southeastern Connecticut Region," the Policy Board is composed of nine members: The Commissioners of the State Departments of Transportation, Environmental Protection, and Planning and Energy Policy; the Chairman of the Southeastern Connecticut Regional Planning Agency and five SCRPA representatives appointed by the Chairman. The Commissioner of each participating state department and the Chairman of SCRPA may name alternates to represent them on the Policy Board. Each federal agency providing financial assistance to the region's transportation planning efforts or expressing interest in those efforts, may name a representative to sit as a non-voting member of the Policy Board.

As its name implies, the Policy Board decides how the planning will be accomplished and by whom, and coordinates all transportation-related planning that affects Southeastern Connecticut. It also is responsible for providing for the involvement of a broad range of political interest groups and citizen participation by affording such organizations and individuals adequate opportunities to express their views for consideration early enough in the planning process to influence the course of Policy Board deliberations and actions. The Policy Board must approve the region's transportation plan.

2. Coordination Board

The Policy Board is assisted in meeting its responsibilities by the Coordination Board, which consists of technical staff from the member agencies of the Policy Board. The Coordination Board, through periodic meetings, centralizes the many facets of the planning process and translates the policy decisions of the Policy Board into specific work assignments. The day-to-day work of transportation planning is conducted under the leadership of a transportation planner on the SCRPA staff. The planner is assisted by staff personnel from the other member agencies of the Policy Board, who provide data, analysis and other assistance as needed.

3. Citizen Participation

Throughout the planning process opportunity is provided for local participation from municipal officials, boards, commissions and from the general public. This is accomplished through news releases, public meetings, work sessions with local officials

and other individuals, and by maintaining an "open-door" policy with respect to all planning activities. An extensive mailing list, together with special releases through the news media, keep the public informed about the status of planning and invite public reaction.

The organizational structure for transportation planning is summarized in Figure 2.

B. DATA RESPONSIBILITIES

The responsibilities for providing data for use in preparing the Regional Transportation Plan are divided among the various agencies represented on the Policy Board. These responsibilities are prescribed in the Operations Plan for the Continuing Urban Transportation Planning in Southeastern Connecticut.

The agencies and the data subjects for which they are responsible are as follows:

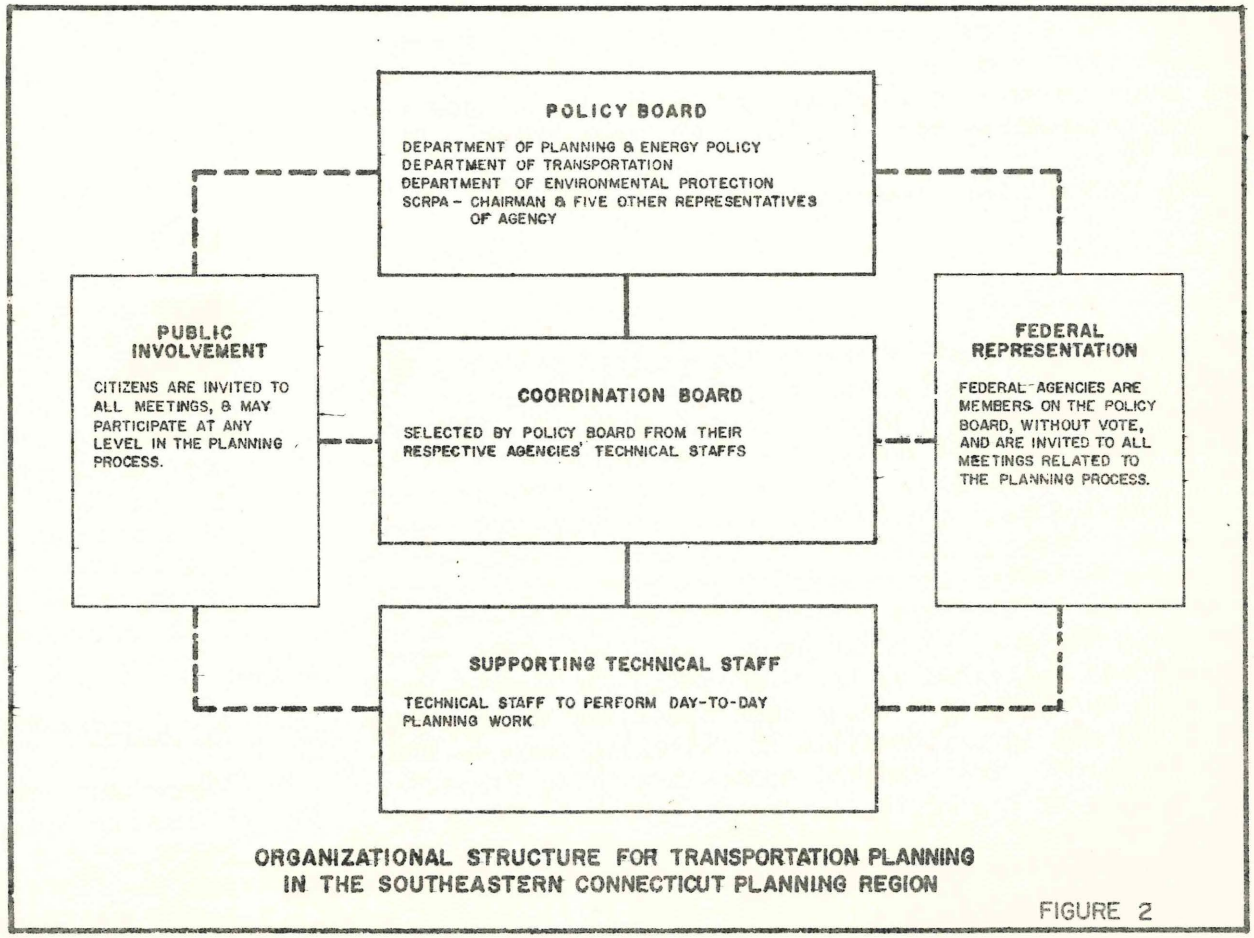
1. State Department of Planning and Energy Policy - population, income, employment and statewide land use plans.

2. State Department of Transportation - vehicle registration, travel and transportation systems information by all modes.

3. State Department of Environmental Protection - refuse disposal and management planning, outdoor recreation, and air and water quality management planning.

4. SCRPA - existing land use, housing, local and regional plans.

All of the participating agencies are responsible for continuous review of the transportation plan and program for the region to assess its consistency with the Connecticut Air Quality Implementation Plan.


POLICY BOARD
DEPARTMENT OF PLANNING & ENERGY POLICY
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SCRPA - CHAIRMAN & FIVE OTHER REPRESENTATIVES OF AGENCY
PUBLIC INVOLVEMENT
CITIZENS ARE INVITED TO ALL MEETINGS, & MAY PARTICIPATE AT ANY LEVEL IN THE PLANNING PROCESS.
COORDINATION BOARD
SELECTED BY POLICY BOARD FROM THEIR RESPECTIVE AGENCIES' TECHNICAL STAFFS
FEDERAL REPRESENTATION
FEDERAL AGENCIES ARE MEMBERS ON THE POLICY BOARD, WITHOUT VOTE, AND ARE INVITED TO ALL MEETINGS RELATED TO THE PLANNING PROCESS.
SUPPORTING TECHNICAL STAFF
TECHNICAL STAFF TO PERFORM DAY-TO-DAY PLANNING WORK

ORGANIZATIONAL STRUCTURE FOR TRANSPORTATION PLANNING IN THE SOUTHEASTERN CONNECTICUT PLANNING REGION

FIGURE 2

III. FUNDING TRANSPORTATION

Significant amounts of money are spent annually at all governmental levels for a broad range of transportation facilities, improvements, services and planning.

A. LOCAL FUNDING

The two major expenditures for transportation at the local level are for local road maintenance and improvements and for school busing. Municipalities in Southeastern Connecticut spent an estimated $4,000,000 on maintaining local roads during FY 1975. Each municipality received a Town Aid Grant from CONNDOT to help in meeting these costs. The grants, which are based on a formula related to the miles of improved local roads in each municipality, amounted to $16,457,000 statewide in the most recent fiscal year.

Table 2 shows what each of the region's towns spent for school busing during the 1973-74 school year. Together, the 18 towns spent over $2,000,000 for this service. This is the second highest municipal cost for transportation activities.

Some area towns also support special transportation programs for the elderly. In most instances this service was initially assisted by grants from the Area Agency on Aging (AAA). Table 1 indicates the recent funding for these programs.

Several of the region's towns are in the process of forming a Regional Transit District which will provide intermunicipal and local bus service to the participating communities, all in accordance with the Transit Development Program recently completed for the region. [A TRANSIT DEVELOPMENT PROGRAM FOR THE SOUTHEASTERN CONNECTICUT REGION. Urban Transportation Systems Associates, Inc., for SCRPA, September, 1975.]

Although the capital costs for the district will be met by a federal grant from the Urban Mass Transportation Administration, and by a state grant from CONNDOT, municipalities will have to share in the expected operating costs not covered by revenues from rider fares. These costs will depend upon the level of service provided and the ridership in each participating town.

B. STATE FUNDING

P.A. 75-568 of the 1975 Session of the General Assembly provides that all activities of the Connecticut

TABLE 1

EXPENDITURES FOR TRANSPORTATION FOR THE ELDERLY

Town	Local Contribution* FY 1975	Local Contribution* FY 1976	AAA Contribution FY 1975	AAA Contribution FY 1976	Service
East Lyme	$13,212	$ 1,000	$ 9,390	$ 9,409	1 mini bus
Groton	9,000	4,016	9,214	4,510	1 van
Montville	12,454	-	18,133	9,000	1 20-pass. bus
New London	12,600	26,966	19,797	14,413	1 bus, 1 stn. wgn. escort
Norwich	5,450	5,800	8,175	11,300	1 van, taxi back-up
Stonington	5,646	-	8,469	8,413	1 van
Waterford	20,817	15,501	-	-	2 vans
TOTAL**	$79,179	$53,283	$73,178	$57,045	

* Local contribution may be cash or in-kind services.
** Larger 1975 costs reflect expenses for capital equipment.

Source: Area Agency on Aging and municipal officials.

TABLE 2

COST OF OPERATION OF TOWN-OWNED AND CONTRACTED-FOR SCHOOL BUSES - 1973-1974

	Town-Owned Buses						Contracted-For Buses					
Town	No. of Buses	Aggregate Miles	Cost	Cost Per Mile	Pupils Transported	Cost Per Pupil	No. of Buses	Aggregate Miles	Cost	Cost Per Mile	Pupils Transported	Cost Per Pupil
Bozrah							6	65,796	52,387[1]	.80	565	92.72
Colchester							16	218,034	119,919[2]	.55	1,746	68.68
East Lyme							16	183,336	105,787[1]	.58	3,310	31.96
Franklin							7	62,460	40,082[2]	.64	387	103.57
Griswold							11	175,680	107,740[1]	.61	1,434	75.13
Groton							45	544,139	376,227[1]	.69	5,152	73.03
Ledyard							28	496,800	181,090[2]	.36	3,532	51.27
Lisbon							6	83,718	53,278[2]	.64	721	73.89
Montville	22	241,200	103,468[1]	.43	3,221	32.12						
New London							9	49,500	51,982[1]	1.05	1,124	46.25
N. Stonington							12	122,760	75,987[1]	.62	1,073	70.82
Norwich							33	384,470	254,018[3]	.66	5,908	43.00
Preston							11	157,900	88,852[1]	.56	1,070	83.04
Salem							6	73,122	42,546	.58	451	94.34
Sprague	7	116,655	28,080[1]	.24	662	42.42						
Stonington							19	313,920	171,990[1]	.55	2,637	65.22
Voluntown							4	86,760	29,673[1]	.34	305	97.29
Waterford	1	12,734	2,732[3]	.21	12	227.67	20	238,240	173,878[1]	.73	3,418	50.87
TOTAL	30	370,589	134,280		3,895		249	3,256,635	1,925,436		32,833	

1. Includes part or all Special Education and Vocational Technical Costs.
2. Includes part or all Vocational Costs.
3. Includes part or all Special Education Costs.

Source: Connecticut State Department of Education, Bureau of Educational Management and Finance

Department of Transportation be funded from the state's General Fund. This includes funding of highway projects, mass transportation, aeronautics and waterways. There is no way of determining what amounts of money are likely to be spent in a particular geographic area of the state on transportation improvement projects.

During the current fiscal year, the CONNDOT is expected to provide $13,916 toward planning of transportation activities in Southeastern Connecticut. This amount represents total or partial funding for seventeen transportation-related planning tasks, as outlined in the "Unified Work Program for Transportation Planning in the Southeastern Connecticut Planning Region for Fiscal Year 1976," prepared by the Southeastern Connecticut Transportation Planning Policy Board in March, 1975.

C. FEDERAL FUNDING

In terms of amounts of monies available and variety of programs, the federal government offers substantial funding for transportation activities. As with the state Transportation Fund, the federal monies are not allocated to substate areas, but rather to certain functional programs. The following paragraphs summarize these federally-funded programs. [Information summarized from U.S. DOT and CONNDOT publications.]

1. Interstate Highway System. $3 billion has been authorized for use nationally in FY 1976 toward the completion of the Interstate System. Connecticut's share is estimated to be about $85 million this year and is expected to increase to $93 million per year in 1977, 1978 and 1979. Interstate System funding is 90% federal and 10% state matching. Under certain conditions, mass transit facilities may be substituted for highway improvements in urban areas under this program.

2. Urban Systems. This funding applies to selected high traffic volume arterial and collector routes and local streets in the previously defined "urban areas." The selection of streets and highways on the urban systems route network is determined jointly by local officials and the regional planning agency, with concurrence by CONNDOT. Funding of improvements on urban systems routes is 70% federal and 30% state, except that the municipality is responsible for one-half of the non-federal share for projects occurring on local streets. The funds may be used for projects intended to improve the carrying capacity or safety of any eligible road. They may also be used for mass transit purposes.

Connecticut's share of federal funds for Urban Systems projects is estimated to be $11 million per year through 1976. Of this amount 44%, or about $4.8 million is to be used in the eight urban areas of the state with populations of less than 200,000 persons, which includes Southeastern Connecticut's urban areas.

3. Rural Primary and Secondary Highway Systems. Rural Primary routes, together with the interstate highways, are the nation's most important highways, connecting major cities and other important features. Rural Secondary routes function more as collector routes, channeling traffic to the interstate and primary routes.

Federal funds for improvements of these systems are available on a 70/30% federal/state matching basis. An estimated $15.4 million is available to Connecticut during FY 1976.

4. Off-systems Improvements. This program provides funding for improvements to any rural road or bridge which is toll-free, open to public use, under public jurisdiction, and not on any federal-aid system. This

program provides 70% of the costs from federal sources, with the municipality or state providing the other 30%. Allocations to Connecticut for this program were only slightly over $1 million in FY 1976.

5. Highway Safety. Federal funding for a variety of measures to correct roadway deficiencies is available on a 90/10% federal/state matching basis for federal-aid highways other than interstate routes. Types of projects eligible for funding under this program include: rail-highway crossings, high-hazard road locations, removal or relocation of roadside obstacles, and bridge replacement.

6. Public Transportation Provisions. Subject to approval by the Secretary of Transportation, improvements which enhance public transportation, such as bus lanes, loading areas or passenger shelters may be made on federal-aid routes. Funds are also available to provide fringe-area parking for public transit passengers.

Major funding of mass transportation is available under the provisions of the National Mass Transportation Act of 1976, which provides funds through the Urban Mass Transportation Administration (UMTA). This Act apportions more than $62 million to Connecticut for capital and operating expenses of public transportation facilities through 1980. Southeastern Connecticut's share of this is estimated to be more than $3.3 million over the 6-year period from 1975 to 1980. A breakdown of expected state and regional funding by year is shown on Table 4.

7. Bikeways and Walkways. The federal government will fund 70% of the cost of providing such facilities along non-interstate federal-aid highways. Such facilities would be funded from appropriations for the system on which the facility is located.

TABLE 3

FEDERAL AUTHORIZATIONS FOR FY 1976
FOR HIGHWAY IMPROVEMENTS

(Dollars in Millions)

System	Amount
Interstate	$3,000
Rural Primary	700
Rural Secondary	400
Urban Systems	800

Source: Federal Highway Administration.

TABLE 4

NATIONAL MASS TRANSPORTATION ASSISTANCE ACT OF 1974

Estimated Apportionments

Fiscal Year	Southeastern Connecticut	Total for Connecticut
1975	$ 250,000	$ 4,692,000
1976	416,000	7,819,000
1977	541,000	10,166,000
1978	646,000	12,122,000
1979	708,000	13,294,000
1980	750,000	14,076,000
TOTAL	$3,311,000	$62,169,000

Source: Connecticut Department of Transportation.

8. Airports. Under the provisions of the Airport Development Acceleration Act of 1973, airport improvements, including runways and taxiways, are funded up to 75% by federal grants. Under the same Act, certain safety equipment may receive funding of up to 82% of total cost from federal sources.

It is impossible to plan without having some sense of the values and aspirations of the community-at-large. These community values are translated into community goals and policies. The goals and policies reflect the collective judgement of the at-large community and relate closely to the particular problems which the community believes are most in need of attention. The goals and policies are operational. That is, they are neither too broad to be misconstrued nor too narrow to foreclose desirable options.

An accurate set of goals and policies will provide decision-makers with rational, realistic guidelines. The goals and policy statement will provide content for the development of a transportation planning program. As particular problems are solved, the goals and policies statement may be adjusted to reflect the current situation.

A. COMPREHENSIVE PLANNING GOALS RELATING TO TRANSPORTATION PLANNING

General Goal

Protect the natural environment while creating a physically healthy, economically sound, socially desirable and attractive human environment for all residents of Southeastern Connecticut.

Population Size

Maintain a moderate rate of population growth.

Population Distribution

Maintain a level of population density in each community which both complements the existing character of each community and encourages the most efficient use of existing public facilities, public transportation, and utility systems.

Land Use Development

Encourage a pattern of development that does not destroy natural environmental processes or the region's scenic qualities and which can be serviced efficiently or economically with necessary public facilities.

B. ENERGY CONSERVATION

Goal

Make energy conservation an important element in transportation planning actions.

Policies

1. Encourage the use of transportation modes which have a potential for savings in fuel consumption.

2. Encourage car pooling.

3. Encourage a greater use of public transportation.

C. GENERAL TRANSPORTATION GOALS AND POLICIES

Goal

Develop a balanced, integrated, efficient and safe overall transportation system that includes all modes potentially useful within Southeastern Connecticut, including public transportation. Provide convenient

access for all segments of the population, regardless of age, race, or income status, to all parts of the region and to important points beyond its borders.

Policies

1. Emphasize the development of all useful modes of public transportation, including mini buses, ferries, special vehicles, bicycles, pedestrian ways, all in a balanced fashion.

2. De-emphasize the use of private automobiles through the effective enforcement of traffic and parking regulations and the provision of alternative modes.

3. Provide effective coordination for all modes of transportation through schedules and provisions of multi-modal terminals.

4. Discourage through traffic from using central areas of cities by providing by-passes.

5. Emphasize safety improvements on the existing highway system for the use of autos and pedestrians.

6. Encourage the effective use of existing parking places in the central business districts through informational programs.

7. Emphasize effective citizen participation in the transportation planning process.

Goal

The region's transportation services and facilities should contribute to the enhancement of the desirable social, economic and environmental qualities of life in Southeastern Connecticut.

Policies

1. Create conditions of social, economic and physical stability rather than uncertainty, disruption and destruction.

2. Establish environmental quality standards which must be met by all existing or future transportation services and facilities, in both construction and operation.

3. Ensure that transportation facilities avoid adverse impact on historical, open space, recreational and watershed areas and structures, while at the same time providing accessibility to them.

4. Control the quality of the road-side environment by seeking legislation and developing regulatory programs.

Goal

Utilize existing and future transportation resources (of the region) as a tool in the solution of the region's social, economic and environmental problems.

Policies

1. Increase accessibility to jobs and the job market through improved public transportation.

2. Reduce, insofar as practical, the need for travel through intelligent land use planning.

3. Propose establishment of controls over new land use developments that occur as an outgrowth of transportation investments. Encourage public use of opportunities created by the development of sites adjacent to new transit stops.

4. Ensure that all people including the elderly, handicapped, low income, students, bicycle riders, who presently suffer because of the auto-dominant transportation system be given higher priority with respect to their specialized needs through public transportation facilities and services.

Goal

Help achieve better coordination of the administrative and financial resources of the region, state and federal governments in the development of a transportation system.

Policies

1. Develop a close working relationship with member communities having transportation concerns in common for the purpose of identifying and working together to deal effectively with interrelated transportation problems and opportunities.

2. Establish as a high priority program the promotion of public transit for intraregional transit services and facilities as needed by the region.

3. Strive to make current state and federal transportation funding policies and procedures match the region's transportation needs.

4. Encourage the promotion of a regional transit district to ensure that efficient public transit is a reality in the region.

Goal

Develop techniques for the measurement of performance of various programs.

Policy

Provide in the Unified Work Program a work element for the development of quantitative goals and evaluation techniques.

D. TRAFFIC OPERATIONS

Goal

Provide traffic operations improvements for better and safer traffic flow and for the efficient movement of people and goods on the region's highway system.

Policies

1. Improve the use of existing facilities through the rearrangement and provision of turning traffic lanes.

2. Improve traffic operations by the provision of central medians on 4-lane highways, painting of channelization strips, changes in signal times, modernization of intersections, and the proper placing and designing of traffic signs.

3. Increase the control of access on heavily-travelled corridors through the closing of access from certain local roads.

4. Work for the removal of the tolls at the Montville Toll Station on the Connecticut Turnpike to shift traffic from Route 32 to the Turnpike.

E. PUBLIC TRANSPORTATION

Goal

Strive for the establishment of an efficient public

transportation system which meets the travel needs of the region.

Policies

1. Give high priority to the establishment of a public transportation system in the region.

2. Promote the use of public transit services by doing the following:

   a. Continually encourage the towns with urbanized areas to respond to regional transit needs and encourage people to think transit.

   b. Develop an information system for the general public to encourage the use of transit.

   c. Provide signs and shelters at bus stops.

   d. Respond to the changing needs of the public regarding schedules and routings.

   e. Provide free transfer facilities to encourage ridership.

   f. Coordinate transit schedules with those of other modes of transportation.

   g. Encourage reduced fares for the elderly and handicapped.

   h. Give special consideration to the handicapped in the transit system.

   i. Encourage promotional programs in cooperation with business communities to induce ridership.

Goal

Explore the possibility of multi-modal public transportation for travel within and beyond the region.

Policies

1. Promote commuter park-and-ride facilities wherever feasible.

2. Encourage the provision and use of public transit for intertown travel for shopping, recreation, work, and modical or social service purposes.

3. Encourage the use of car pooling by providing free car-parking facilities.

4. Provide preferential parking for car-pooling vehicles at the point of destination.

5. Promote the use of public transportation for work by encouraging express buses to the major employment points at morning and evening peak hours.

6. Encourage the use of transit through special promotional efforts in cooperation with major commercial operators.

7. Encourage special transit runs for recreational travel during summer months to major recreational areas.

F. BICYCLES

Goal

Establish region-wide bicycle routes which minimize potential conflicts with motor vehicles.

Policies

1. Promote bicycles as a transportation mode.

2. Encourage the use of bicycles for utility trips

and work trips of less than 3 miles as a practical alternative to the use of private motor vehicles.

3. Encourage cities and towns to develop bicycle networks, making predominant use of local roads and streets where feasible.

4. Encourage the provision of parking for bicycles, particularly at places of employment and at transportation terminals.

V. REGIONAL CHARACTERISTICS

A. REGIONAL DEVELOPMENT

1. Historical Perspective

Back in the 17th and 18th centuries, the people of Southeastern Connecticut relied very little on transportation facilities. By and large the towns and villages of that day were similar to one another and were largely self contained. Most of the ingredients of life could be found in the town in which a man was born. Most people were employed within their town of residence, and a trip to market in another town was rare enough to be an event.

The 19th century brought stronger relations among the communities of the region. Mills developed mainly along streams with water power potential. And then, as now, the towns with employment opportunities attracted workers from neighboring communities. But the degree to which one town supplied workers for plants in another was far less than what we know now. Without the mobility of the automobile, the area within which travel to work or to shop was practical was considerably limited.

It was not until the present century that the improved financial status of workers and the general availability of the automobile made possible a wider dispersion of population and a greater separation between place of residence, place of work, and place of shopping. A daily drive to work in another town has replaced the walk to the factory at the end of Main Street. A weekly trip to a shopping center in a neighboring town has replaced a daily walk to the local store. And a daily ride on the school bus to a regional school in another town has replaced the walk to the small local school.

These changes have meant a greater specialization on the part of each community. Specialization has, in turn, meant a growing interdependence among the communities of the region. Because of this, the real structure and functional relationship among communities of the region and the lines of communication that tie them together cannot be seen by examining merely the individual towns. Only when all of the towns of the region are examined as one unit is it possible to fit together the specialized pieces and see the functional whole.

2. Present Land Usage

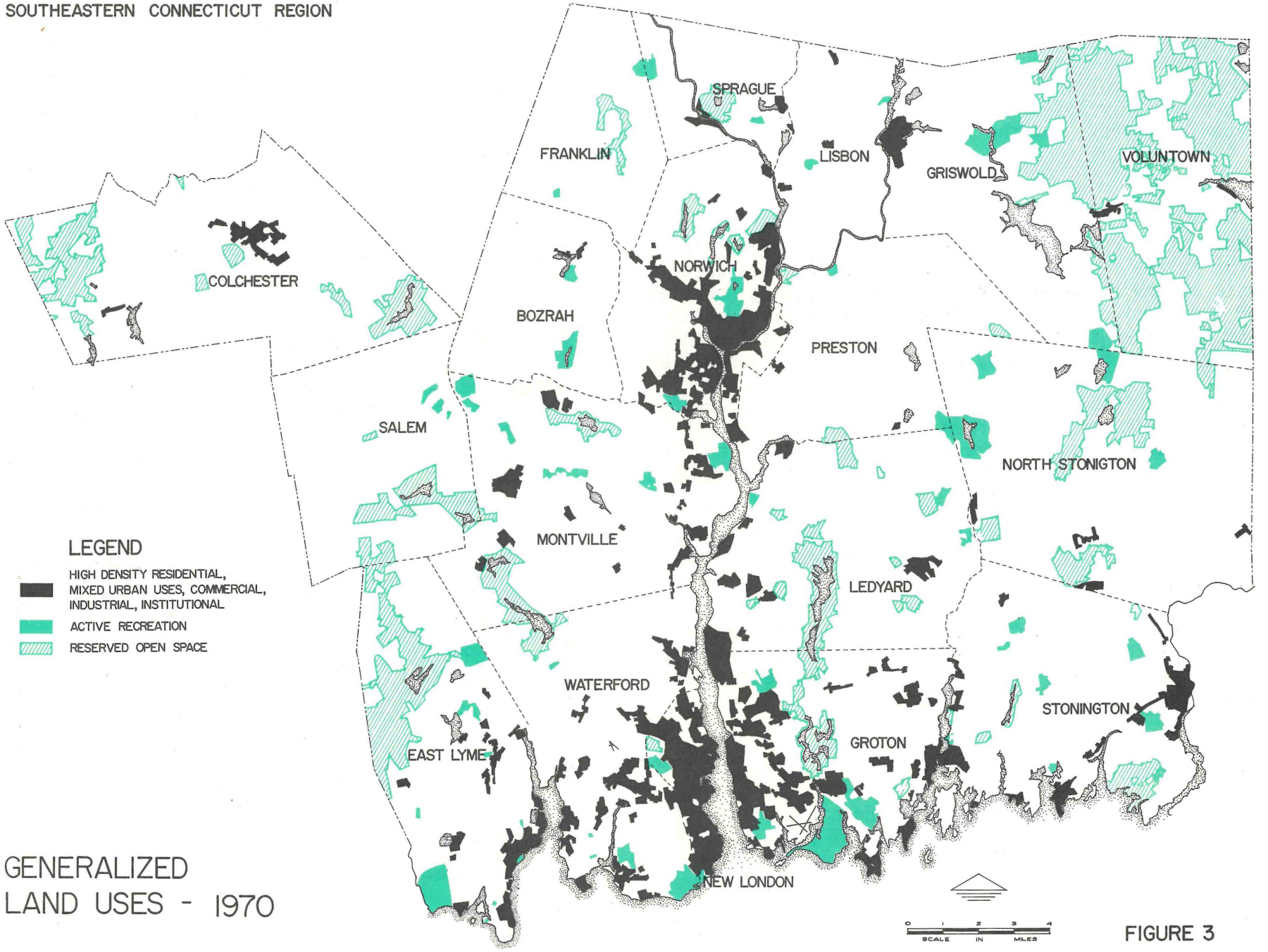
Southeastern Connecticut is still largely undeveloped, with only 14.3% of the region used for intensive purposes. Out of the total land area of the 18-town region of 560 square miles, intensive development occupies 80 square miles. The distribution pattern of this development resembles an inverted "T" along the coast of Long Island Sound and the Thames River Valley. (See Figure 3.)

To clarify the presentation of land use data, the region's towns have been classified according to their population density and predominant land uses.

2.1. Municipal Classification.

Three towns in the region are predominantly urban in character. These are Groton, New London, and Norwich. Each had a 1970 population density exceeding 1,000 persons per square mile and each has considerable industrial and commercial activity. Of the other 14 towns, five are definitely rural. These are Bozrah, Franklin, North Stonington, Salem, and Voluntown. All of them had 1970 population densities of less than 100 persons per square mile. The remaining 10

SOUTHEASTERN CONNECTICUT REGION



GENERALIZED LAND USES - 1970

FIGURE 3

SCRPA 1975

towns are classified as suburban.

Figure 4 shows the distribution of municipalities in each category. Throughout this discussion of land usage, it should be remembered that the urban towns represent only 11% of the region's land area, the suburban towns 60%, and the rural towns 29%.

2.2. Housing.

Residential uses are the largest consumer of developed land in the region, accounting for 48% of developed uses at the regional level. In area, housing occupies 39 square miles. The percentage is slightly greater for the urban towns at 51% and slightly less for the suburban and rural towns, with 48% and 47% respectively.

Higher densities (1/2 acre or less per family) are concentrated in the three urban communities, which together have 55% of the region's higher density housing. 44% of this type housing is in the suburban towns and only 1% in the rural towns.

The 10 suburban municipalities contain 70% of the region's medium density housing and 67% of the low density housing.

The five rural towns contain relatively small amounts of all of the region's housing stock. They have only 2% of the high density housing, 3% of the medium density and 20% of the low density housing.

2.3. Commercial.

Although the suburban communities have collectively attracted a large amount of commercial uses, the urban centers of Groton, New London and Norwich still contain just more than half of the region's total commercial development. The suburban towns now have 44% of this land use, while the rural towns have 5%. Total Commercial uses account for 2.7 square miles.

2.4. Industry.

Intensive industrial uses such as manufacturing, fabrication, and processing account for 1.3 square miles and are similar to high density residential uses in that they are concentrated in the urban and suburban towns. 54% of intensive industrial development is located in the urban towns, 44% in the suburban towns, and 2% in the outlying rural towns.

As shown on Figure 5, the region's major industries are located near the coast or in the Thames River Valley.

2.5. Other Developed Uses.

Common institutional intensive uses such as municipal buildings and churches are found in every town. But in total, intensive institutional uses tend to aggregate with other developed uses in the urban towns,

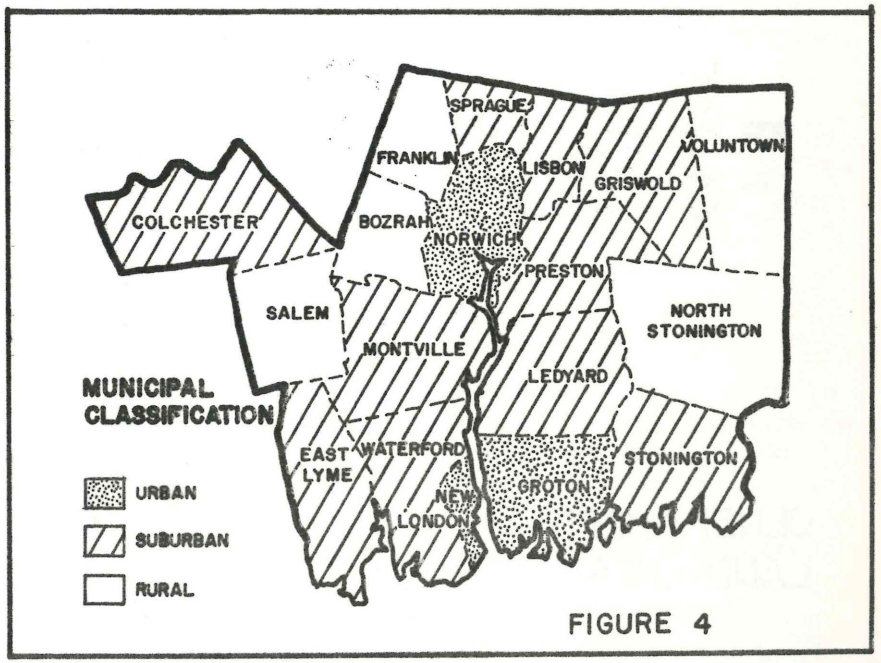
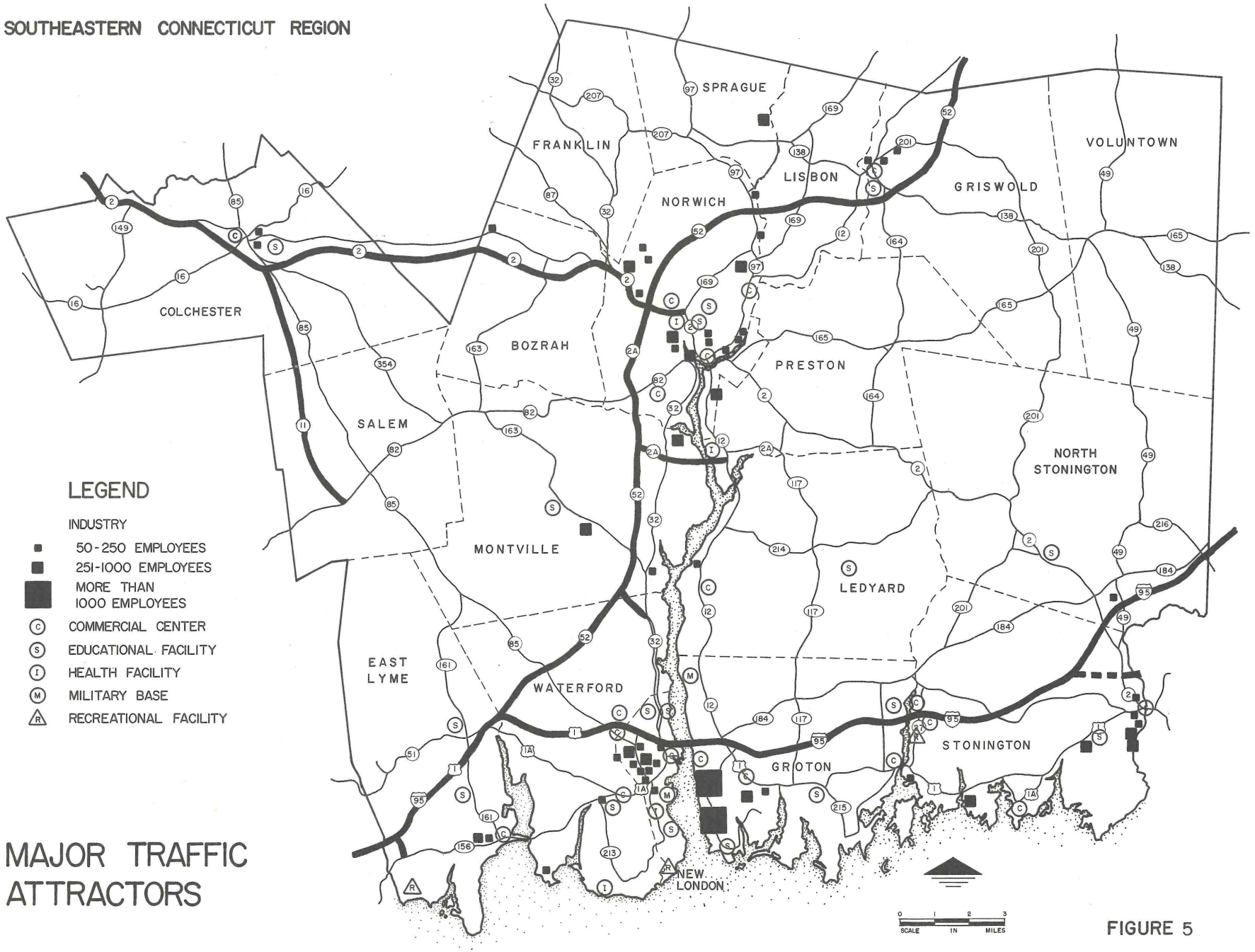


FIGURE 4



MAJOR TRAFFIC ATTRACTORS

FIGURE 5

which total 53% of this use, and in the suburban towns with 44% of this use. This category includes such uses as the U.S. Naval Submarine Base, the Naval Underwater Systems Center, the U.S. Coast Guard Academy, and the Norwich State Hospital which serve also as employment centers and are located in the urban communities.

Transportation, communication, and utility uses account for 30% of the developed uses, or 24.2 square miles. With some limited exceptions, most of this use is attributed to local roads, state highways, and limited access highways.

Major public facilities and services that have a significant effect on traffic and transportation needs include educational, court, and health facilities. A regional technical college and a community college are located in Norwich and a branch of the University of Connecticut is in Groton. Court facilities serving the southern part of the region are in New London, while those serving the northern part are in Norwich. Major general hospitals are located in Norwich, New London and on the Sub Base in Groton. Norwich Hospital, a major state mental institution, is on Route 12 in Preston. A clinic is located adjacent to Interstate Route 95 in Groton.

A regional approach to refuse disposal is being considered by the region's communities. Recommendations have been made for major refuse disposal facilities that would generate heavy truck traffic, but no specific agreement concerning sites for such facilities has been reached to date.

2.6. Reserved Open Space Uses.

Some 68 square miles of the region, or 12% of its total land area is reserved open space. State preserves represent 40 square miles of this, while another 14 square miles are water company lands. Both the state preserves and the water company holdings are located, for the most part, outside of the more urbanized area of the region.

Municipal parks and playgrounds, golf courses and other private and public recreational facilities are found scattered mostly throughout the urban and suburban towns. These uses total 14 square miles.

Southeastern Connecticut's extensive frontage on Long Island Sound, its numerous inland water bodies, and its wealth of historic buildings and sites, make it attractive for seasonal homes, recreation areas and tourism in general. This results in a significant increase in summertime traffic on many of the region's highways and local roads and streets. The increase is most noticeable on weekends and in the southern or coastal portion of the region, generally on Interstate Route 95 and to the south of it. Particularly heavy congestion occurs in the vicinity of Route 27, where Mystic Seaport and other features generate significant traffic volumes.

2.7. Agriculture.

Most of the land used for agriculture in Southeastern Connecticut is located in the rural towns and the outer sections of the suburban towns, which together account for 95% of the agricultural uses. In total, the region has about 39 square miles of land in this category, which is about 7% of the region's land area.

2.8. Undeveloped Land.

373 square miles, or 67% of Southeastern Connecticut, is undeveloped, which means this land is not used for developed, open space, or agricultural purposes. This land includes forests, wetlands and open fields which for the most part lie beyond the developed urban towns. These urban towns account for only 8% of

the total undeveloped land, the suburban towns 63%, and the rural towns 29%.

2.9. Changes in Growth Patterns.

Land use changes between 1962 and 1970 were plotted to determine where new growth was occurring. The urban towns accounted for 22% of this new growth, the suburban towns 67%, and the rural towns 11%. (These same groupings of towns account for 11%, 60%, and 29%, respectively, of the region's land area.) Although the suburban towns as a group accounted for 67% of the new growth, it should be noted that only 15% of their total land area is developed. Similarly, the rural towns, with 12% of the growth, are only 5% developed. By way of contrast, the urban towns accounted for 22% of the growth, but they are 38% developed. This indicates that although all three classes of towns have ample room for future growth, the suburban-rural towns have the most room, and presently the suburban towns are the fastest growing, continuing a trend first recognized in 1962.

New growth in the urban towns was generally in-filling of or accretion to existing development, usually towards the periphery of these areas. Growth in the suburban towns was scattered and not concentrated as in the urban towns.

3. Land Use and Traffic

The distribution pattern of various land uses influences the volume, timing and flow patterns of traffic. For example, housing produces work, shopping, recreation and service vehicle trips. Shopping centers generate employee, customer, and delivery trips. Industry causes worker trips, deliveries of raw materials and product distribution trips. Other specialized land uses, like hospitals, schools and military establishments create other types of trips too. Each type of trip may occur mainly at a different time of the day.

Figure 3 shows, in general form, the distribution pattern of urbanized land uses throughout the region. As noted earlier, the general pattern resembles an inverted "T", focusing on the coast and the Thames River. Scattered development, largely residential, may be found throughout the region, with occasional concentrations beyond the area of the inverted "T", or development core.

Almost all of the region's major traffic generators are within the development core. Figure 5 shows the locations of manufacturing firms employing more than 50 persons, major warehousing and retail commercial centers, major recreation facilities, high schools and colleges, hospitals, and military installations. Residences also are more heavily concentrated in the core area of the region.

Since development has in the past been heavily influenced by the locations of transportation facilities, it is not surprising to find the employment features and residential concentrations linked together by a system of streets, highways, rail lines and waterways. In more recent years new expressways (the Connecticut Turnpike and Interstate Route 95) have been constructed in a location that generally skirts the development core, yet at the same time affords quick and convenient automotive access from one part of the core to another. The expressways were built primarily to accommodate through traffic, but also are used extensively by local traffic because of their convenient locations.

Interchange points on expressway routes, and particularly along the interstate route, are particularly attractive to a variety of land uses. Every interchange point on I-95 has generated economic development in recent years, some of which has seriously and adversely affected traffic flows on local roads,

resulting in major expenditures to the secondary road system. These instances emphasize the need for careful land use planning coicident with highway planning. The laissez faire approach to land development along the region's major road network has caused, and will continue to cause, many traffic control and safety problems.

Greater control can and should be exercised by the Connecticut Department of Transportation in granting access permits for properties fronting on state highways. Property access should be planned on an area-wide basis, rather than in response to individual requests from property owners. Site planners as well as traffic engineers should be involved in the review of plans for access to such properties. A definite change in the present procedures for issuing access permits seems warranted.

B. POPULATION

1. Distribution and Density

The distribution pattern of Southeastern Connecticut's 1970 population is shown on Figure 6. This map shows that the population like the developed lands, is concentrated along the coast of Long Island Sound and along the Thames River valley, forming an inverted "T" shape. Population growth outside of this area is thinly scattered, although concentrations do appear in extensive suburban residential developments, such as the Highlands in Ledyard, Montville Manor in Montville, Jewett City and the Borough of Colchester.

Population densities range from a high of over 5,700 persons per square mile in New London with its small land area and large concentration of people to only 37 persons per square mile in Voluntown with its large concentration of state forests. The overall regional density was 394 persons per square mile, well under Connecticut's average of 605 persons per square mile. 111,613 people, or 51% of the region's population, reside in the three urban communities, and yet as previously stated, these communities account for only 11% of the region's land area. The rural towns have 10,045 inhabitants for 5% of the region's population, although they account for 29% of the region's land area. The 98,744 people of the suburban towns account for 44% of the region's population and are located on 60% of the region's land area.

2. Growth

The 1970 population of 220,402 was a 23% increase over the 1960 regional population. Urban towns grew almost 9% from 1960-1970, the suburban towns 41% and the rural towns 55%.

According to State Health Department estimates, the region has grown almost 3% from 1970 through 1974. During this period the urban towns had a negative growth rate of 0.1%, while the suburban and rural towns had respective growth rates of 6% and 8%. Ninety percent of the 6,398 population gain occurred in the suburban towns, 12% in the rural towns and negative 1.8% in the urban towns. This clearly indicates that the move to the suburbs has continued and accelerated. If the current growth rate continues for the remainder of the decade this will result in a 1980 population about 7% larger than in 1970.

3. Projections

The purpose of population projections is to try to identify the future results of certain influences and assumptions that affect population growth. Projection is an art that attempts to provide reasonable assessments about the future based on assumptions concerning fertility, mortality and migration. This should be clearly understood by users such as public

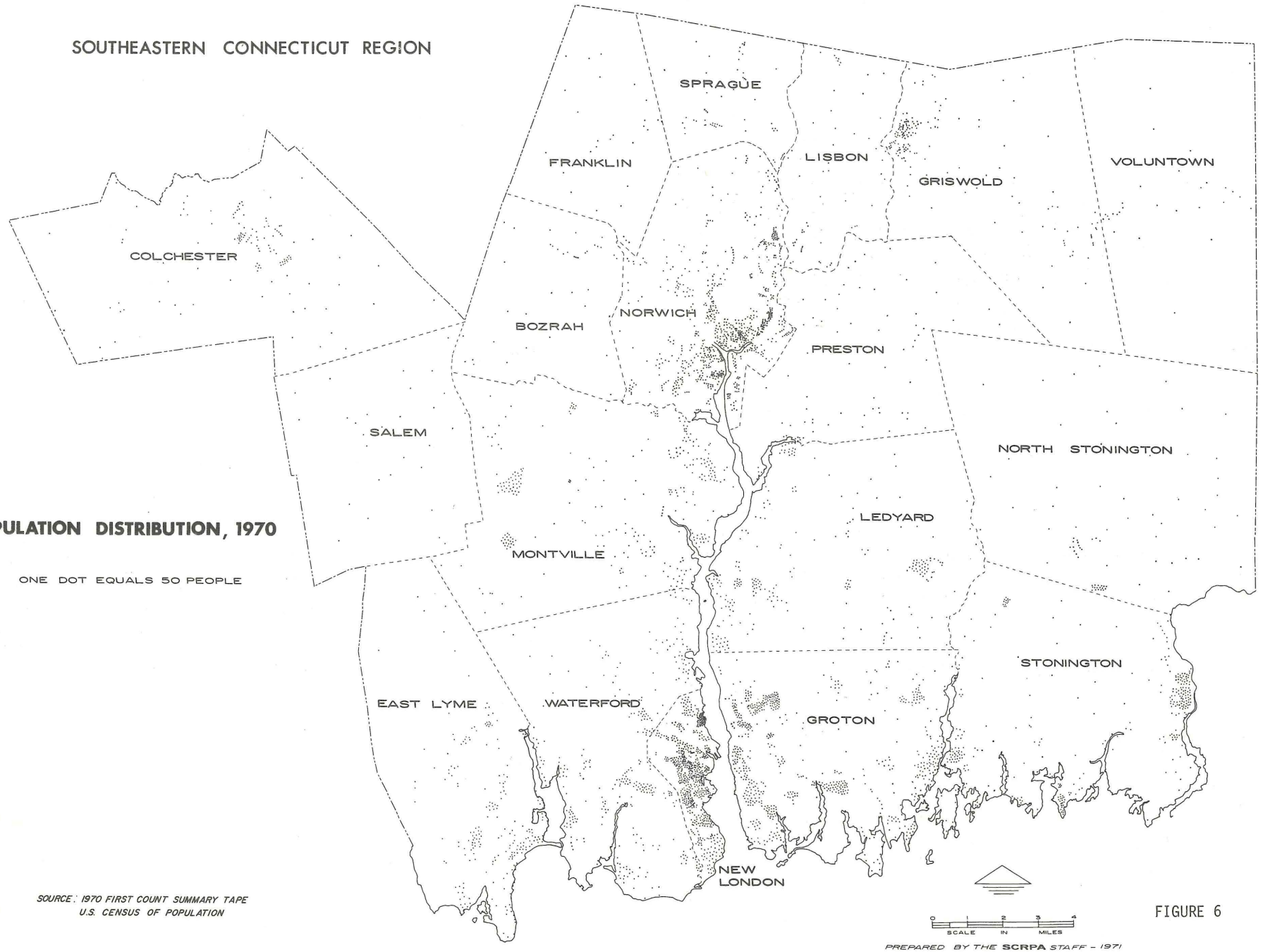

SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
BOZRAH
NORWICH
PRESTON
SALEM
NORTH STONINGTON
POPULATION DISTRIBUTION, 1970
ONE DOT EQUALS 50 PEOPLE
LEDYARD
MONTVILLE
STONINGTON
EAST LYME
WATERFORD
GROTON
NEW LONDON
SCALE IN MILES
SOURCE: 1970 FIRST COUNT SUMMARY TAPE U.S. CENSUS OF POPULATION
PREPARED BY THE SCRPA STAFF - 1971

FIGURE 6

and private decision-makers. Projections should be continually reviewed to reflect new data, trends, and methodologies.

Because no one method of population projection is entirely reliable, four approaches were used to provide a range of likely estimates within which, hopefully, the actual population would occur. These four approaches were averaged to arrive at the 1980 regional estimates. Although each approach has a basic set of assumptions, all methods assume that the 1970-74 trend will be fairly representative of the next five years and that there will be no major changes in existing conditions. If a major change occurs which results in major new residential construction, then these population estimates should be adjusted based on the new information.

The 1980 and 1990 projections are shown on Table 5 and Figure 7. The 1980 total would be a 14% increase over the 1970 regional population, as compared to a 23% increase during the 1960s.

The 1990 figures are based on the 1980 projections and should be regarded as best estimates subject to revision after the 1980 census. They show an approximate 1990 distribution of population based on the 1970-80 growth rate and a town's share of 1980 population.

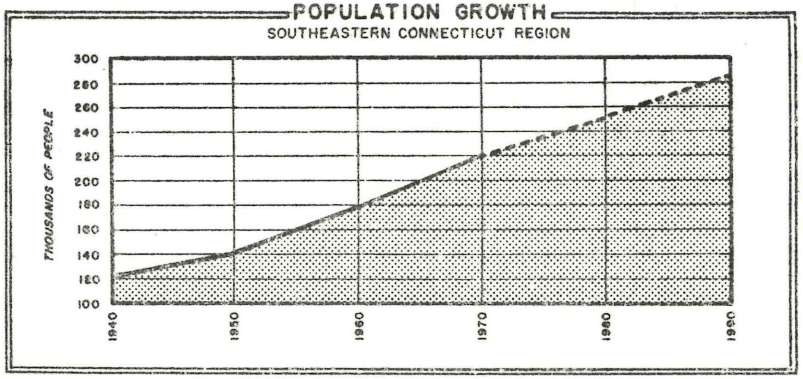


FIGURE 7

C. LABOR FORCE AND EMPLOYMENT

1. Labor Force

In the spring of 1970, Southeastern Connecticut had a total civilian labor force of slightly more than 79,000 persons 16 years old or older. Of this total 62% were males and 38% were females.

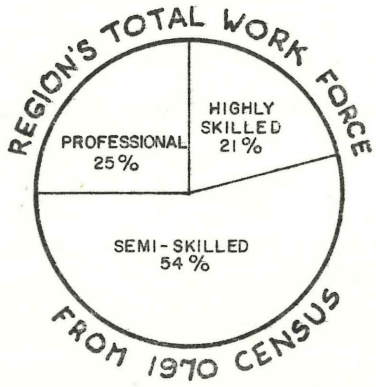
TABLE 5

POPULATION PROJECTIONS, 1980 AND 1990

	Actual 1970	1980	1990
Bozrah	2,036	2,400	2,750
Colchester	6,603	8,300	9,500
East Lyme	11,399	15,700	17,950
Franklin	1,356	1,650	1,900
Griswold	7,763	9,200	10,550
Groton	38,244	39,950	45,650
Ledyard	14,837	18,000	20,550
Lisbon	2,808	3,450	3,950
Montville	15,662	17,000	19,450
New London	31,630	32,900	37,600
North Stonington	3,748	4,400	5,000
Norwich	41,739	48,700	55,650
Preston	3,593	4,600	5,200
Salem	1,453	2,200	2,500
Sprague	2,912	3,400	3,900
Stonington	15,940	17,800	20,350
Voluntown	1,452	2,000	2,250
Waterford	17,227	20,350	23,300
REGIONAL TOTAL:	220,402	252,000	288,000

Prepared by the SCPRA Staff, 1975.

The piegraph shows the percentage distribution of skill levels in the work force. These do not differ markedly from those of the state as a whole, each category being within three percentage points of the state figures.



Within the region there were significant differences in the occupational skills of the population from one town to another. The suburban towns have a noticeably higher concentration of professional and highly-skilled occupations among their residents. As a group, the suburban towns had about 50% of their resident workers in the two highest skill classes. In contrast the urban towns had 46% and the rural towns 43% respectively.

2. Manufacturing Employment

The trend in employment in manufacturing has been downward in the Southeastern Planning Region in recent years. In 1959, according to the 1960 U.S. Census, 39% of the resident labor force was employed in manufacturing, while the comparable figure for 1969 was 34%.

Textiles have declined in the region as the dominant employer, being replaced by the construction of submarines for the U.S. Navy at the Electric Boat Division of General Dynamics in Groton. Another expanding employer is chemicals, represented in the region by the Charles Pfizer Company in Groton and Dow Chemical in Ledyard.

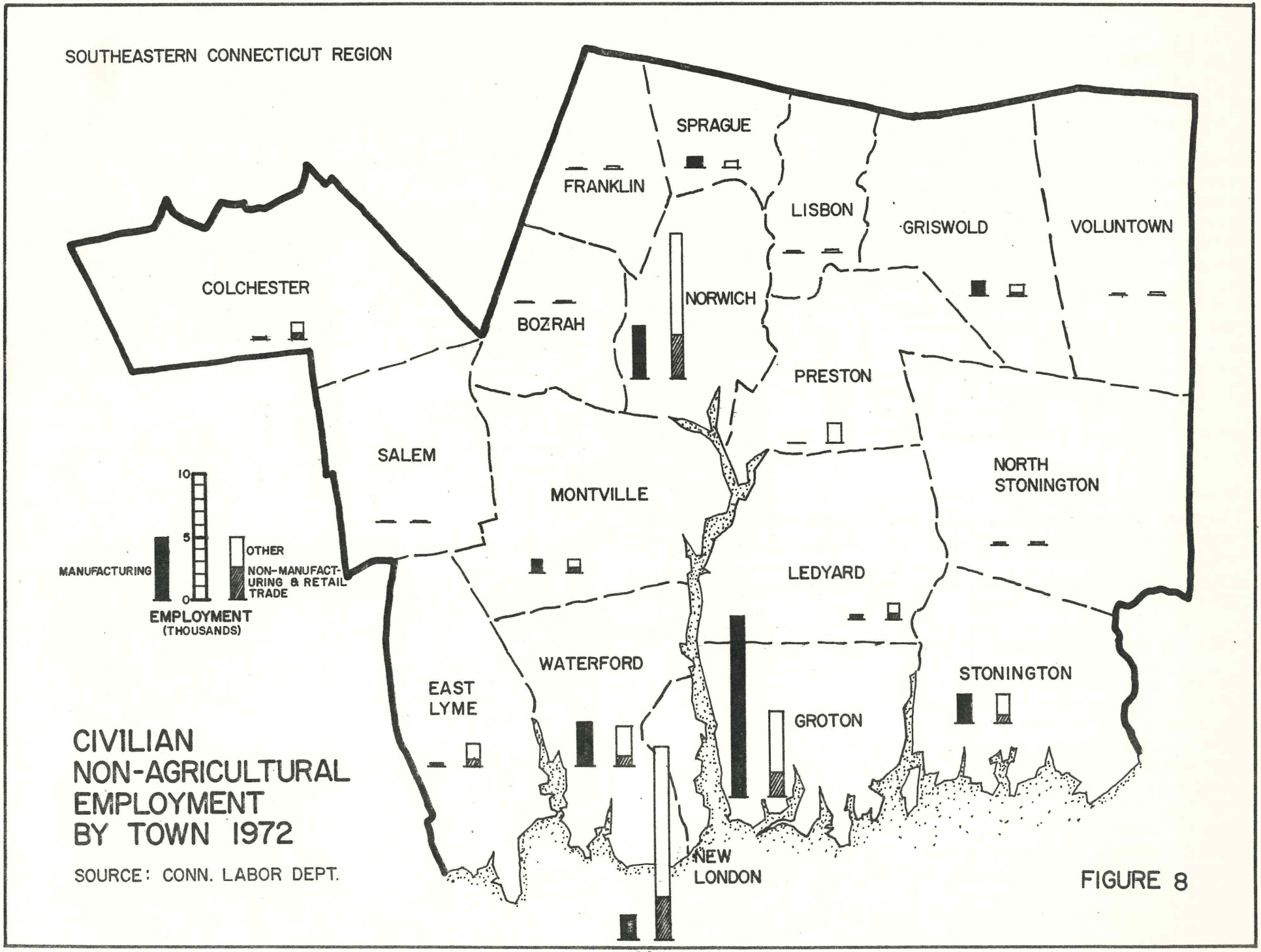
Figure 8 shows manufacturing and non-manufacturing employment by town. This figure also illustrates the dominance of Groton in manufacturing, as well as the primary position of the three urban towns of Norwich, New London and Groton in non-manufacturing employment. These three towns thus are the commercial and service employment centers of the region.

3. Non-manufacturing Employment

Figure 8 also depicts non-manufacturing employment by town in the region in 1972, as well as one of the most significant categories of that employment, retail trade.

Both total non-manufacturing employment and retail trade employment show a pattern similar to that shown for manufacturing, in that their distribution throughout the region roughly follows the population distribution among the urban, suburban and rural towns. Retail trade is of concern from a planning standpoint because it is an important land use and an important traffic generator, as well as a significant employer of the labor force.

The comparison between 1960 and 1972 reveals that retail trade remains concentrated in the urban towns. Also, the total number of people employed in retail trade increased about 13% while total regional population increased 29%.


SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
NORWICH
BOZRAH
PRESTON
SALEM
MONTVILLE
NORTH STONINGTON
LEDYARD
WATERFORD
EAST LYME
STONINGTON
GROTON
NEW LONDON
10
5
0
MANUFACTURING
OTHER
NON-MANUFACTURING & RETAIL TRADE
EMPLOYMENT (THOUSANDS)
CIVILIAN NON-AGRICULTURAL EMPLOYMENT BY TOWN 1972
SOURCE: CONN. LABOR DEPT.
FIGURE 8

4. Defense Employment

As has been the case ever since World War II, a very large part of the economy of Southeastern Connecticut in the last ten years has been supported by defense industry and by the presence of large numbers of military personnel. In fact, defense employment could be said to constitute the region's economic base. The major installations are the Electric Boat Division of General Dynamics Corporation in Groton, which is engaged in submarine design and construction; the U.S. Navy Submarine Base, also in Groton; the New London Laboratory of the Naval Underwater Systems Center; and the U.S. Coast Guard Academy. In addition there are several Coast Guard cutters based in New London, as well as the New London Coast Guard Station. In this section, employment and income data are presented to draw a comparison between the region's current degree of defense industry dependence and that of ten years ago.

This discussion does not consider the secondary employment that is generated by the earnings of defense workers and military personnel, nor does it consider employment by other military contractors in the region. Most of the latter are subcontractors, and their effect on the region's economy is minor.

Basic defense employment data are presented in Table 6.

In 1973, defense employment accounted for almost 34% of the total number of jobs in the region, in contrast to almost 42% in 1963. However, the percentage has gone up again since that time because of increased employment at Electric Boat. That company has received an increased number of orders for attack submarines and is a major participant in the Trident program under which a new fleet of strategic missile submarines will be constructed. Electric Boat's employment in the early summer of 1975 was 17,250.

Table 7 compares Electric Boat's employment for 1973

TABLE 6

DEFENSE EMPLOYMENT,
SOUTHEASTERN CONNECTICUT REGION, 1963-1973

	1973	% of Total	1963	% of Total
1. Defense Employment				
Military Personnel	14,100	15.4	13,000	16.4
Civilian Employees of Military Bases	2,300	2.5	2,300	3.0
Employees of General Dynamics/Electric Boat	14,700	16.0	17,500	22.1
Defense Employment Total:	31,100	33.9	32,800	41.5
2. Other Non-defense Employment	60,600	66.1	46,300	58.5
3. Total Employment	91,700	100.0	79,100	100.0

Sources: Connecticut Labor Department, U.S. Navy, U.S. Coast Guard, General Dynamics/Electric Boat Division.

with the number of people 16 years old or older in the civilian labor force for each town. These latter figures are those of the 1970 U.S. Census. The ratio between the two figures in the table for each town gives a rough measure of the fraction of the people in the work force who are employed at Electric Boat. The scale of Electric Boat's employment and its extensive geographic influence have a marked impact on commuting patterns and traffic volumes.

We have assumed that through at least 1980 the numbers of military personnel in the region and employment at the defense establishments will remain roughly at their present levels. This assumption appears to be the best basis for planning because it would mean that the region's economy would not be radically changed, but would be allowed to grow in an orderly fashion. It does, however, mean that diversification of industry in the region would be necessary for

growth in the economy and in population. Also, the physical limitations of the Thames River and its shoreline for construction and basing of large ships would seem to support this assumption.

TABLE 7

EMPLOYMENT AT GENERAL DYNAMICS/ELECTRIC BOAT DIVISION
COMPARED TO THE TOTAL CIVILIAN LABOR FORCE,
SOUTHEASTERN CONNECTICUT REGION

	Employment At Electric Boat, 1973	Civilian Labor Force 16 And Older, 1970	% Of Civilian Labor Force Employed At Electric Boat
Bozrah	38	898	4.2
Colchester	106	2,564	4.1
East Lyme	571	4,145	13.8
Franklin	18	582	3.1
Griswold	199	3,023	6.6
Groton	2,496	10,896	22.9
Ledyard	896	3,666	24.4
Lisbon	103	1,075	9.6
Montville	861	5,859	14.7
New London	1,459	11,498	12.7
North Stonington	258	1,349	19.1
Norwich	1,390	16,421	8.5
Preston	24	1,382	1.7
Salem	15	585	2.6
Sprague	111	1,150	9.7
Stonington	623	6,559	9.5
Voluntown	98	697	14.1
Waterford	1,008	6,870	14.7
Regional Totals:	10,274	79,219	13.0

Sources: General Dynamics/Electric Boat Division; 1970 U.S. Census.

D. INCOME

Income influences transportation in a variety of ways. By whatever measure: effective buying income, per capita income, or family income -- the income a person or family receives will influence the type and number of vehicle trips they generate or their dependence upon public transportation.

Table 8 shows median family income by municipality, for Connecticut, and for the United States in 1969, as derived from the 1970 Census data:

TABLE 8

MEDIAN INCOME, 1969
Southeastern Connecticut Region

Ledyard	$12,237	Preston	$10,783
East Lyme	11,828	Voluntown	10,607
Waterford	11,645	Stonington	10,295
North Stonington	11,496	Griswold	9,833
Colchester	11,426	Lisbon	9,771
Franklin	11,421	Norwich	9,768
Montville	11,129	New London	9,657
Bozrah	11,009	Groton	9,584
Salem	11,000	Sprague	9,134

SOUTHEASTERN CONNECTICUT REGION - $10,454
CONNECTICUT - 11,811
UNITED STATES - 9,590

Source: U.S. Census of Population.

While the State of Connecticut has consistently led the nation with the highest median family income over several decades, the Southeastern Connecticut Region has remained well below the state median both in 1959 and 1969. At the regional level, incomes may be a reflection of the relatively low levels of educational attainment. This strengthens the need for additional educational programs within the region's educational facilities for the benefit of the general public. Since those who might benefit most from such programs are also the ones most lacking in private transportation, there is an obvious linkage between the availability of public transportation and the degree to which people might take advantage of self-improvement programs.

E. PERSONAL VEHICLE OWNERSHIP AND TRENDS

In general, automobile ownership has a consistent relationship with the income level of an area. Variations occur because of the distribution of driver-age population and the distance from developed areas. As automobile ownership increases, transit riding decreases. Automobile ownership is also an important variable in the determination of trip generation.

Table 9 indicates information on auto ownership for 1974. Car ownership for occupied households for each town was developed. An analysis of the concentration of automobiles in 1974 is shown in Table 10.

Automobile registrations increased by nearly 14% between 1970-74 (Table 11). However, there was a slowing down in the growth rate in 1974. Table 12 shows a sharp increase in motorcycle registrations over the 1970-74 period. The rate of increase in motorcycles was 167% -- more than 10 times the rate for automobiles. However, the number of registered motorcycles in 1974 was still only one-twentieth of the number of registered automobiles.

TABLE 9

RELATIONSHIPS OF AUTOMOBILES AND HOUSEHOLDS, 1974

	None	1 Car	2 Cars	3 Cars or More	Total # of Occupied Households	Total # of Cars*	# of Cars Per Household
Groton	532	5,705	3,453	620	10,306	16,262	1.57
New London	2,243	4,871	2,198	447	9,759	12,171	1.247
Norwich	2,189	6,509	3,699	739	13,136	18,709	1.424
Urban Totals:	4,964	17,085	9,350	1,806	33,201	47,142	1.419
Colchester	182	673	815	169	1,828	3,651	1.997
East Lyme	184	1,399	1,552	203	3,338	6,837	2.04
Griswold	279	1,287	696	174	2,423	3,478	1.435
Ledyard	53	1,225	1,677	210	3,165	5,935	1.875
Lisbon	56	333	328	116	833	1,453	1.744
Montville	167	1,806	2,036	336	4,345	7,679	1.76
Preston	45	433	463	94	1,035	1,762	1.702
Sprague	47	419	345	51	862	1,452	1.684
Stonington	616	2,546	1,856	275	5,293	8,306	1.569
Waterford	288	2,164	2,190	521	5,163	9,724	1.883
Suburban Totals:	1,917	12,285	11,958	2,149	28,285	50,277	1.777
Bozrah	16	218	238	58	541	984	1.818
Franklin	11	207	183	37	430	792	1.841
North Stonington	37	496	436	77	1,046	2,003	1.914
Salem	10	159	231	67	435	772	1.774
Voluntown	42	166	201	41	463	917	1.98
Rural Totals:	116	1,246	1,289	280	2,915	5,468	1.875
REGIONAL TOTALS:	6,997	30,616	22,597	4,235	64,401	102,887	1.597

* Assessment of 1974.
Source: Connecticut Department of Transportation, Division of Planning. Household data from 1970 Census.

TABLE 10

DENSITY OF AUTOMOBILES, 1974

	# of Cars 1974	Population July 1973	Area in sq. miles	# of Cars Per 1000 of Population	# of Cars Per Sq. Mile
Bozrah	984	2,200	20	447.2	49.2
Colchester	3,651	7,000	47.8	521.5	76.3
East Lyme	6,837	12,300	34.8	555.8	196.4
Franklin	792	1,400	20	565.7	39.6
Griswold	3,478	8,000	37.6	434.75	92.5
Groton	16,262	38,000	38.3	427.9	424.5
Ledyard	5,935	15,000	40.5	395.6	146.5
Lisbon	1,453	3,100	16.5	341.0	88.0
Montville	7,679	16,500	43.9	465.3	174.9
New London	12,171	30,900	7.3	393.8	1,667.2
North Stonington	2,003	3,900	56.3	513.5	35.5
Norwich	18,709	43,600	27.1	429.1	690.3
Preston	1,762	3,800	31.3	463.6	56.2
Salem	772	1,600	29.9	482.5	25.8
Sprague	1,452	3,100	13.4	468.3	108.3
Stonington	8,306	16,300	42.7	509.5	194.5
Voluntown	917	1,500	39.7	611.3	23.0
Waterford	9,742	17,700	36.7	549.3	264.9
TOTAL	102,887				

Source: Connecticut Department of Transportation.

TABLE 11

AUTOMOBILE REGISTRATIONS BY TOWN, 1970-74

	1970	1971	1972	1973	1974
BOZRAH	888	904	930	936	984
COLCHESTER	2,921	3,105	3,288	3,464	3,651
EAST LYME	5,454	5,650	6,081	6,435	6,837
FRANKLIN	632	698	730	791	792
GRISWOLD	3,088	3,229	3,344	3,380	3,478
GROTON	14,197	14,750	15,361	16,223	16,262
LEDYARD	4,808	5,110	5,424	5,635	5,935
LISBON	1,231	1,309	1,345	1,372	1,453
MONTVILLE	6,546	6,894	7,128	7,433	7,679
NEW LONDON	11,649	11,795	11,714	12,224	12,171
NORTH STONINGTON	1,693	1,749	1,858	1,926	2,003
NORWICH	16,839	17,383	18,032	18,564	18,709
PRESTON	1,484	1,564	1,646	1,698	1,762
SALEM	627	677	690	732	772
SPRAGUE	1,275	1,374	1,423	1,413	1,452
STONINGTON	7,543	7,812	7,924	8,185	8,306
VOLUNTOWN	737	780	838	907	917
WATERFORD	8,664	8,957	9,236	9,472	9,724
TOTAL	90,276	93,740	96,992	100,790	102,887

Source: Connecticut Department of Transportation.

TABLE 12

MOTORCYCLE REGISTRATIONS, 1970-74

	1970	1971	1972	1973	1974
BOZRAH	19	23	37	47	60
COLCHESTER	81	143	177	171	214
EAST LYME	119	169	204	253	265
FRANKLIN	20	28	32	45	52
GRISWOLD	84	101	138	156	226
GROTON	396	636	798	1,024	1,137
LEDYARD	108	208	276	297	344
LISBON	33	48	70	83	101
MONTVILLE	146	241	324	404	490
NEW LONDON	196	297	346	427	453
NORTH STONINGTON	45	81	99	123	136
NORWICH	293	412	469	708	826
PRESTON	33	45	50	76	96
SALEM	20	22	31	39	44
SPRAGUE	32	45	67	76	99
STONINGTON	138	216	264	280	327
VOLUNTOWN	35	48	60	81	95
WATERFORD	213	287	373	396	411
TOTAL	2,011	3,050	3,815	4,686	5,376

Source: CONNDOT

F. RETAIL SALES

Retail sales for 1962 and 1972 are summarized in Table 13.

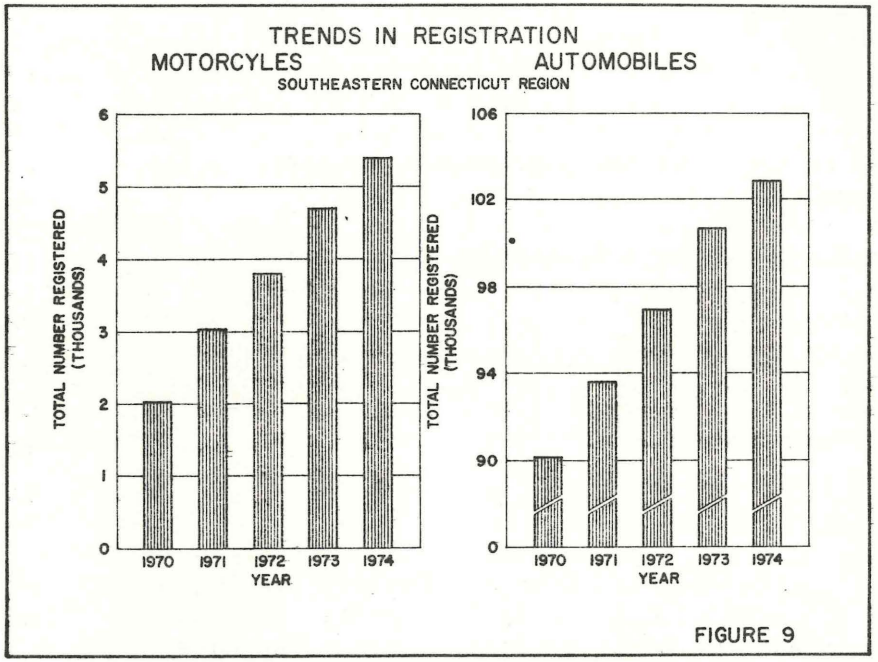


FIGURE 9

TABLE 13

TOTAL RETAIL SALES,
SOUTHEASTERN CONNECTICUT REGION, 1962 AND 1972

Types of Sales	1972 Thousands of $	1972 % of Total	1962 Thousands of $	1962 % of Total
Food	141,833	28.1	91,067	36.1
Apparel	17,128	3.4	14,517	5.7
General Merchandise	51,928	10.2	22,460	8.9
Automotive Equipment	135,261	26.7	48,778	19.3
Furniture and Fixtures	30,668	6.0	15,313	6.1
Building	49,700	9.8	19,014	7.5
Miscellaneous	80,366	15.8	41,489	16.4
Total:	506,884	100.0	252,638	100.0

Sources: 1962, Connecticut Development Commission.
1972, Connecticut Department of Commerce.

Comparison of the 1972 percentages of total sales for 1972 with those of 1962 is of interest. In 1972 28.1% of total expenditures were for food, in contrast to 36.1% in 1962. Expenditures for automotive equipment rose from 19.3% to 26.7%. Thus in 1972 they approached expenditures for food. Relative expenditures for other categories of goods do not seem to have changed to any great degree.

Retail trade employment remains concentrated in the three urban communities of New London, Groton, and Norwich, which together provide about 70% of the region's retail jobs. This concentration has obvious implications on intertown travel for shopping purposes.

G. AGRICULTURE

At the present time, the two major categories of agricultural activity in the region are poultry farming, primarily egg production, and dairy farming. In addition, the growing of horticultural products for sale to homeowners and landscaping firms is a significant agricultural enterprise. Gross sales of agricultural products are estimated to total $22 million in 1973. [Professor Arthur Dewey, Department of Agricultural Economics, University of Connecticut, Storrs, Connecticut.] In 1973, agricultural employment in the region was estimated at about 850 people, about 1.1% of regional civilian employment. [THE REGION'S ECONOMY 1973, SCRPA, 1974.]

H. THE TOURIST INDUSTRY

Since shortly after World War II when construction of military submarines became the dominant industry in Southeastern Connecticut, the need for diversification of employment opportunities has been felt. One means of helping to fulfill this need has been the tourist industry.

At the present time, indications are that tourist activity is on the increase. For example, annual attendance at Mystic Seaport has increased from 305,000 in 1962 to 536,000 in 1974. At least 250 new year-round motel and hotel rooms have been built in the region since 1972 [MARKET DATA, July 1973, and July, 1972. Chamber of Commerce of Southeastern Connecticut.] and over 150 of them have been built in the Mystic area. Norwich has seen the construction of the Norwich Sheraton Motor Inn with 129 rooms, and a 150-room motor hotel is currently being proposed for part of the Winthrop Urban Renewal Area in New London. The opening of the new Mystic Marinelife Aquarium has also added an important new tourist attraction to the area.

These attractions and others in New England have generated considerable visitor and through traffic, resulting in heavy congestion on some local roads and streets. This is particularly so in the Mystic area, where inadequately planned commercial growth has complicated the solution to the traffic problems.

I. DEVELOPMENT POLICIES

Current local land use policies are reflected in the adopted zoning regulations of the region's towns and cities. Presently, all of the region's 18 municipalities have adopted zoning regulations. In addition, there are 9 subunits with zoning powers separate from those of the town. These are the City of Groton, the Boroughs of Jewett City and Stonington, the Noank Fire District, Groton Long Point, and three Beach Associations in East Lyme.

1. Residential Zoning

Land zoned for residential purposes accounts for 91% of the region's zoned land. This easily makes residential zones the dominant zoned use, although one should remember that this often includes public open space which is not available for development.

Most of the residentially zoned land is intended for low density use. Of the total land in residential zones, 95% is intended for lot sizes of 20,000 square feet or greater. Specifically, 25% of this use is in the 20,000-39,999 square feet category, and 70% is in the 40,000 or greater category. The balance of 5% is intended for less than 1/2 acre lots. Specifically, 1% is in the 12,001-19,999 square feet category, and 4% in the 12,000 square feet or less lot size category. Generally, minimum lot size or lot area required per unit of multi-family housing is greatest in the suburban and rural towns and least for the urban towns.

In terms of general location, there is a correlation between the residential density zone and type of town location. 82% of the most dense category (12,000 square feet or less) is located in the urban towns, 18% in the suburban towns and none in the rural towns. Conversely, in the least dense category (40,000 square feet or greater), 2% of the zone is in the urban towns, 61% in the suburban towns, and 37% in the rural towns.

This distribution of residential zones is reflected in current residential land use, as the reader will recall from the earlier section. However, one should realize that the urban towns with the highest density residential zones are also the towns that are the most developed, and so this in effect limits the expansion of higher density housing.

2. Commercial Zoning

All of the zoning regulations provide for some type of commercial activity. A total of 6,592 acres are zoned for commercial use. With a present commercial land use density of one acre of commercial land use per 127 residents, the land presently zoned for commercial activity could support a population of nearly 840,000 or over 3 1/2 times the present regional population. Currently, population projections foresee a regional population of 288,000 by the year 1990.

In terms of the pattern of these commercial zones, the elongated, narrow business strips on either one or both sides of a highway first recognized in 1962 as a potential problem are still evident in the local zoning maps. In recognition of this, the Regional Development Plan postulated that fewer traffic problems would result if compact commercial areas with controlled access were developed. This development in depth rather than strip also favors the attractive power of a grouping of stores rather than an individual business.

3. Industrial Zoning

This trend to overzone is also observed in industrial zoning. Industrial zones account for just over 6% of the region's total zoning, but this amounts to 19,690 acres. Presently, 798 acres are used for manufacturing activities at a density of about 34 workers per acre of use. (This is essentially the same density as existed in 1962). When viewed in terms of potential employment and population levels, these 19,690 acres produce interesting results. At the present employee density, existing zones could accommodate about 659,000 workers. If one assumes that new industrial zones will function at lower employee densities, say to half of present densities or 16 workers per acre, the industrial zones still could accommodate a work force of over 315,000, or over 11 times the present manufacturing work force. At the present ratio of industrial land use to population, the existing industrial zones could support a population of over 5,400,000.

VI. ENVIRONMENT

According to one estimate, that is probably on the low side, transport as a whole accounts for 40% of all harmful substances ejected into the atmosphere. The contamination of the air with lead from highway and air transport surpasses all other forms of pollution from the various sectors of the economy. The pollution by transport (especially by automobiles) is concentrated in the densely populated areas.

The 1970 Federal Aid Highway Act Section 109 (j), Title 23 U.S.C., directed that highways constructed through federal funds be consistent with any approved plan for implementation of any ambient air quality standard. The State Department of Environmental Protection under the statutory authority prepared an air quality implementation plan. The Southeastern Connecticut Region has been given low priority for air quality control analysis from the state standpoint, perhaps due to its lower environmental problems as compared to the other parts of the state.

The following paragraphs discuss the environmental concerns that must be reflected in future transportation planning and project implementation.

A. AIR QUALITY

Air pollution is increasingly recognized as a health hazard. There is growing conviction on the part of public health experts that air pollution in urban centers is a factor in the incidence of primary cancer of the bronchi and lungs. Various preventive measures can be taken through the control of emission of harmful substances into the air, by means of special filters, decreasing the use of leaded gas, and the use of electricity in automobiles. To deal with existing and future air pollution caused by transportation requires techniques to identify the nature, the causes, and the magnitude of the problem so that adequate solutions can be developed. There is a need to examine and evaluate existing methods of monitoring highway air quality and for applying ambient air quality standards to highway projects.

In November of 1975 Henry Beal, Director of Air Compliance with the Connecticut Department of Environmental Protection, reviewed the proposed goals and policies of the regional transportation plan and commented on the region's present air quality situation. His comments were contained in two letters dated 14 November 1975 and are as follows:

"Your region of the state is in violation of Federal and State air quality standards for one type of pollutant, photochemical oxidants (smog). The entire state is in violation, and, we expect will be for some time due to the area-wide nature of the pollutant. The monitor is in Groton.

"Although no violations of the carbon monoxide standard have been monitored in your region, this is probably due to our lack of monitoring. We find violations of this standard at most busy intersections, especially when there is a large volume of prolonged idling traffic. We suspect that New London and Groton probably have intersections which from time to time met this criteria.

"A detailed evaluation of the impact of any land use plan cannot be made by the Department within the next 6 to 8 months. At that time, an evaluation can be made, provided the properly detailed data is obtained.

"There is no current requirement for your region to impose stringent land use controls to comply with air quality regulations, however, possible future "non-degradation" standards will be stricter than

current standards and may result in requirements for land use density zoning in the future.

"To summarize, the overall goals of the [Transportation] Plan do not appear to be inconsistent with the SIP [State Air Quality Implementation Plan], and certainly the overall mood of the plan appears to be one of consistency with the SIP, especially in light of the apparent emphasis on public transportation and de-emphasis of private automobile use. However, it must be noted that there are several goals and policies for which consistency cannot be determined at this time. Partially responsible for this is the fact that our Department does not as yet have an operating technical review procedure for this purpose. Another reason is that some goals and policies have a very remote relation to Air Quality (i.e., achievement of better coordiantion of resources). We should, however, have the capability within the next 6 months to review projects and plans providing we receive the proper technical detail.

"Finally, to answer question (3) of your letter. There is no current Federal requirement for any towns in your planning region to adopt or implement a Transportation Control Plan."

B. NOISE

Noise is generally defined as unwanted sound, "a waste product generated in conjunction with the various activities of man." Traffic noise is measured on the A scale and the unit is thus described as dB(A). The decible scale is logarithmic. An increase of one dB is an effective increase of 10% sound, therefore doubling in volume every 10 dB. It has been demonstrated that the impact of noise can affect human health.

The automobile, trucks, railroads and airlines provide our country with unparalleled mobility. However, they also generate noise and have a potential for interrupting human privacy. Trucks, particularly diesel trucks, are a chief source of motor vehicle noise. Noise becomes excessive if mufflers are removed or altered.

The Federal Aid Highway Act of 1970 requires that noise standards be developed and applied to the planning and design of highway projects. The highway related noise problem is very complex and there is no quick or simple solution. There is a need to develop noise level standards by the State Department of Environmental Protection so that transportation planning actions be evaluated accordingly.

Public Act 74-328, enacted by the Connecticut General Assembly in its 1974 session, directs the Commissioner of the Department of Environmental Protection to prepare and enforce a "comprehensive state-wide program of noise regulation." While a draft of such regulations has been prepared, it had not been subjected to public review or hearings as of December 1975. It is not known when the regulations will be adopted by the DEP Commissioner and become enforceable.

C. VISUAL POLLUTION

It is sometimes said that the motor vehicle is a part of modern life and must be frankly accepted as such. Permanent parking at the curbside and open parking lots are accepted with their damaged curbs, broken railings and battered signs. Visual clutter has been accepted as the price of "progress" by many in this country. [See SCRPA's 1973 report COMMERCIAL SITES: DESIGN AND REVIEW for specific recommendations regarding the visual aspects of parking areas and roadside signs.]

The number of signs repeating the same message in one block surpasses all sensible needs, and too many signs can be as dangerous as too few. Nests of signs, sometimes as many as four and five on one post, challenge the recognition ability of the most

alert motorists. Hardly anyone looks at the design of the sign, the information it conveys, or its relationship to other signs. There is a real need for serious research of the aesthetic considerations for each traffic element.

D. WATER AND SOIL POLLUTION

The role of transportation in water pollution is not so predominant as it is in air and noise pollution. Dumping of oil into sea water is one way through which sea water and beaches are polluted. Another most common form of pollution is use of salt on the highway for snow and ice control. Road salt pollution of streams usually is observed through salt level increases during major spring thaw periods. It also enters surficial aquifers. The runoff which penetrates into the soil increases the salt concentration and affects plant growth.

E. ENERGY CONSUMPTION

The energy consumed by the transportation sector alone in this country is 24% of total energy produced, and 96% of all fuel consumed for transportation purposes is from petroleum products. In response to the Arab oil embargo and rising oil prices, this nation is concerned about energy consumption. The reduction of the speed limit to 55 miles per hour was an appropriate action both for energy consumption and for safety in travel.

Many economists and transportation planners think that mass transit is the answer to long-term energy conservation in transportation and suggest that substantial savings in energy would be achieved by shifting a large segment of automobile users to mass transit. This will also reduce congestion, and ease air pollution problems. The small car and car pooling also play a vital role in saving energy. Transportation actions can contribute toward the national objective of energy self sufficiency.

A. EXISTING FACILITIES

The existing system of streets and highways will serve as the framework for immediate and long-range highway plans in the Southeastern Connecticut Planning Region. For this reason, it is necessary to evaluate the present network of highways and roads to determine the most efficient use of these facilities in the future.

Generally, the region is well served with highways that connect to points both within and beyond its borders. The current system of highways and streets is shown in Figure 10. Not all town roads are included on the map. However, since some of the town roads perform necessary functions for regional travel, important town roads will be made part of the analysis for improvement projects.

The total road miles in the Southeastern Connecticut Region in 1973 was 1,702.74 miles, of which 1,246.1 miles were town roads. Table 14 shows the miles of roads in each town by maintenance category.

B. TRAFFIC

1. Controls and Regulations

In order to move traffic on streets and highways efficiently in densely developed areas, it is necessary to utilize traffic control devices. These devices consist of signs, traffic signals, and pavement markings.

Traffic Signs - One of the principal traffic control devices is the traffic sign. Three separate categories of signs are recommended for use and may be classified as warning, guide, and regulatory.

Warning signs are used to advise the motorist of some

TABLE 14

REGIONAL ROAD MILEAGE

(Road Mileages by Town and by Maintenance Responsibility, as of 12/31/73)

	Area in sq. Miles	1973 Population*	STATE MAINT. Miles**	TOWN MAINT. Miles	Total Mileage
BOZRAH	20.0	2,200	14.44	33.26	47.70
COLCHESTER	48.7	7,000	43.63	85.43	129.06
EAST LYME	34.8	12,300	23.20	91.15	114.35
FRANKLIN	20.0	1,400	17.17	20.07	37.24
GRISWOLD	37.6	8,000	30.73	66.19	96.92
GROTON	38.3	38,000	39.96	115.13	155.09
LEDYARD	40.5	15,000	21.14	86.82	107.96
LISBON	16.5	3,100	18.39	24.71	43.10
MONTVILLE	43.9	16,500	30.77	103.84	134.61
NEW LONDON	7.3	30,900	11.94	62.90	74.84
NORTH STONINGTON	56.3	3,900	35.56	62.37	97.93
NORWICH	27.1	43,600	33.78	151.78	185.56
PRESTON	31.3	3,800	22.43	52.74	75.17
SALEM	29.9	1,600	19.52	34.12	53.64
SPRAGUE	13.4	3,100	9.53	24.59	34.12
STONINGTON	42.7	16,300	36.33	98.28	134.61
VOLUNTOWN	39.7	1,500	18.31	27.59	45.90
WATERFORD	36.7	17,700	29.81	105.13	134.94
TOTAL	584.7	225,900	456.64	1,246.10	1,702.74

* Population figures are Connecticut Department of Health estimates representing population as of July 1, 1973.
** Ramp and Turning Roadway mileages are not included in State maintained miles unless they carry Log-direction mainline routing.

Source: Connecticut Department of Transportation.

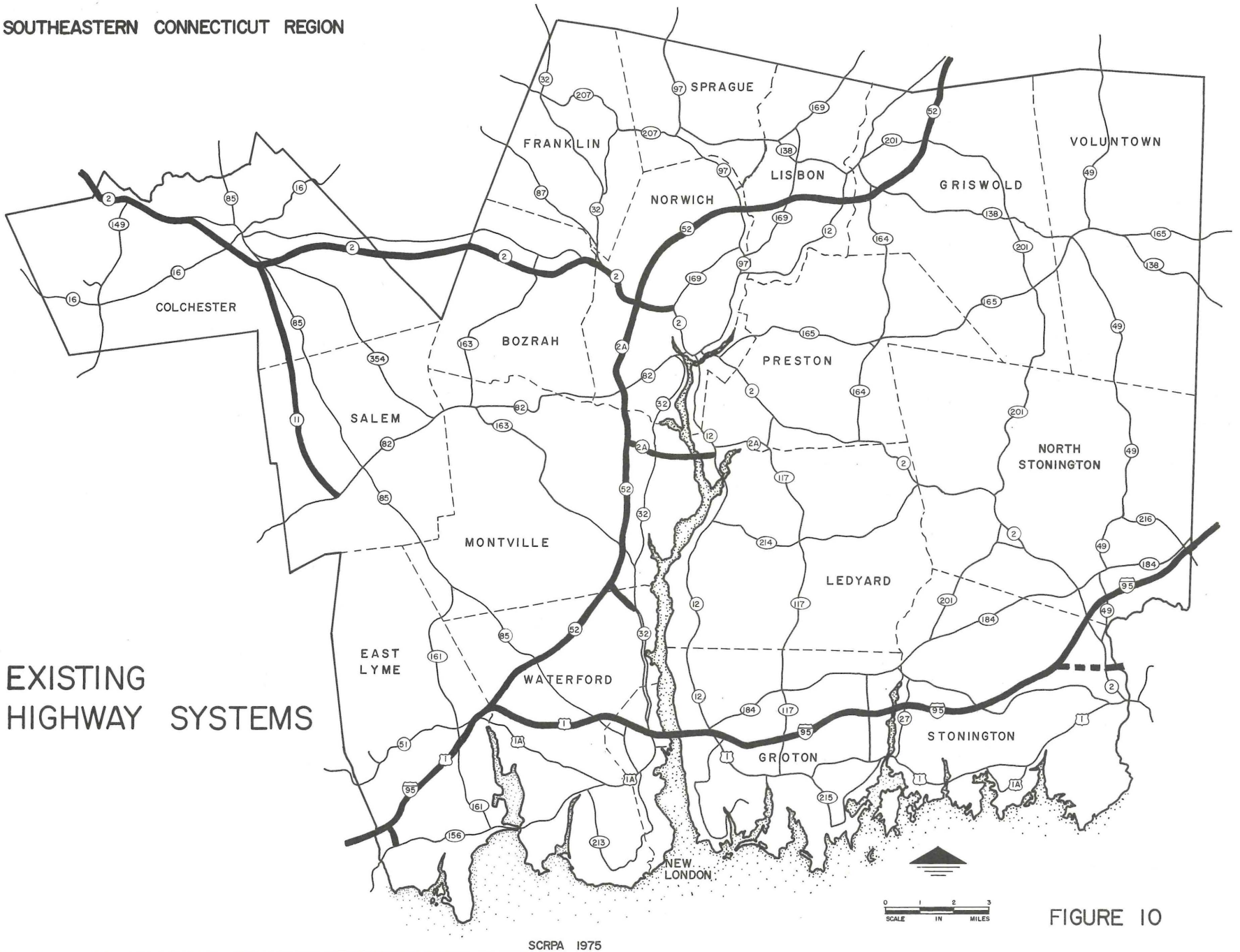

SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
FRANKLIN
VOLUNTOWN
LISBON
GRISWOLD
NORWICH
COLCHESTER
BOZRAH
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
EAST LYME
WATERFORD
STONINGTON
GROTON
NEW LONDON
EXISTING HIGHWAY SYSTEMS
SCALE IN MILES
SCRPA 1975

FIGURE 10

condition on the roadway which may be hazardous if caution is not exercised. For example, warning signs are used for curves, dangerous intersections, and school zones.

Guide signs provide information concerning routes or cities. Signs such as route numbers, distance signs, and directional signs to points of interest are included in this category.

Regulatory signs state some regulation which drivers must obey if they are to avoid a violation of the law. Regulations such as speed limits, turn restrictions, and parking restrictions are marked by this type of sign.

Each of these sign categories serves an important purpose in safe and efficient traffic movement. Therefore, it is essential for these devices to be installed and maintained in conformance with adopted standards.

Traffic Signals - Traffic signals are required at many high volume intersections in an urban area. The signal alternates the assignment of right-of-way to the various approaches to the intersection.

Two general types of traffic signals are currently in use and consists of pretimed and traffic-actuated control. Pretimed signals operate on a predetermined pattern which provides the same amount of green time to the intersection approaches for every cycle, regardless of traffic demand. The traffic-actuated signal controller is actuated by vehicles and varies the amount of green time in accordance with traffic demands present. Both types of signal control can be operated to provide coordiantion of adjacent intersections.

Pavement Markings - Proper, well-maintained pavement markings are inexpensive and useful tools which should be used to promote efficient traffic flow. Examples of pavement markings include lane lines, center lines, no passing zone markings, stop lines, crosswalks, edge lines, and parking stall lines. Proper use of pavement markings, in accordance with accepted standards, can aid in safe handling of heavy traffic volumes.

2. Traffic Volumes

Traffic volumes on the region's highways in 1970 are shown in Figure 11. Flow band widths are annual average daily traffic for that year. However, data for 1974 is available and the volumes noted below are for the year 1974.

Interstate Route 95 is the major east-west traffic carrier with an average daily traffic (ADT) volume of more than 2,500 vehicles where it enters the region from the west, increasing to 60,000 ADT on the Gold Star Bridge across the Thames River at New London and Groton.

U.S. Route 1 carries traffic in Groton and Stonington and ranges from 8,000 to 19,000 ADT, while Route 32 has an ADT of about 16,000 between Norwich and New London. On the east side of the Thames River, the Route 12 ADT is about 12,000. Other routes also have significant volumes, ranging up to 9,000 ADT. The portion of Connecticut Route 52 in this region has an ADT of about 13,000 vehicles.

Traffic volumes vary throughout the day on any given highway. Peak-hour volumes occur when workers are traveling to and from work. Fluctuations in traffic volumes also occur on different days of the week and during the separate months of the year. Table 15 indicates hourly variations.

3. Current Major Capacity Deficiencies

Several highway segments in the region carry traffic loads in excess of their "practical" capacity at certain times during the day.

Capacities are computed by making several assumptions,

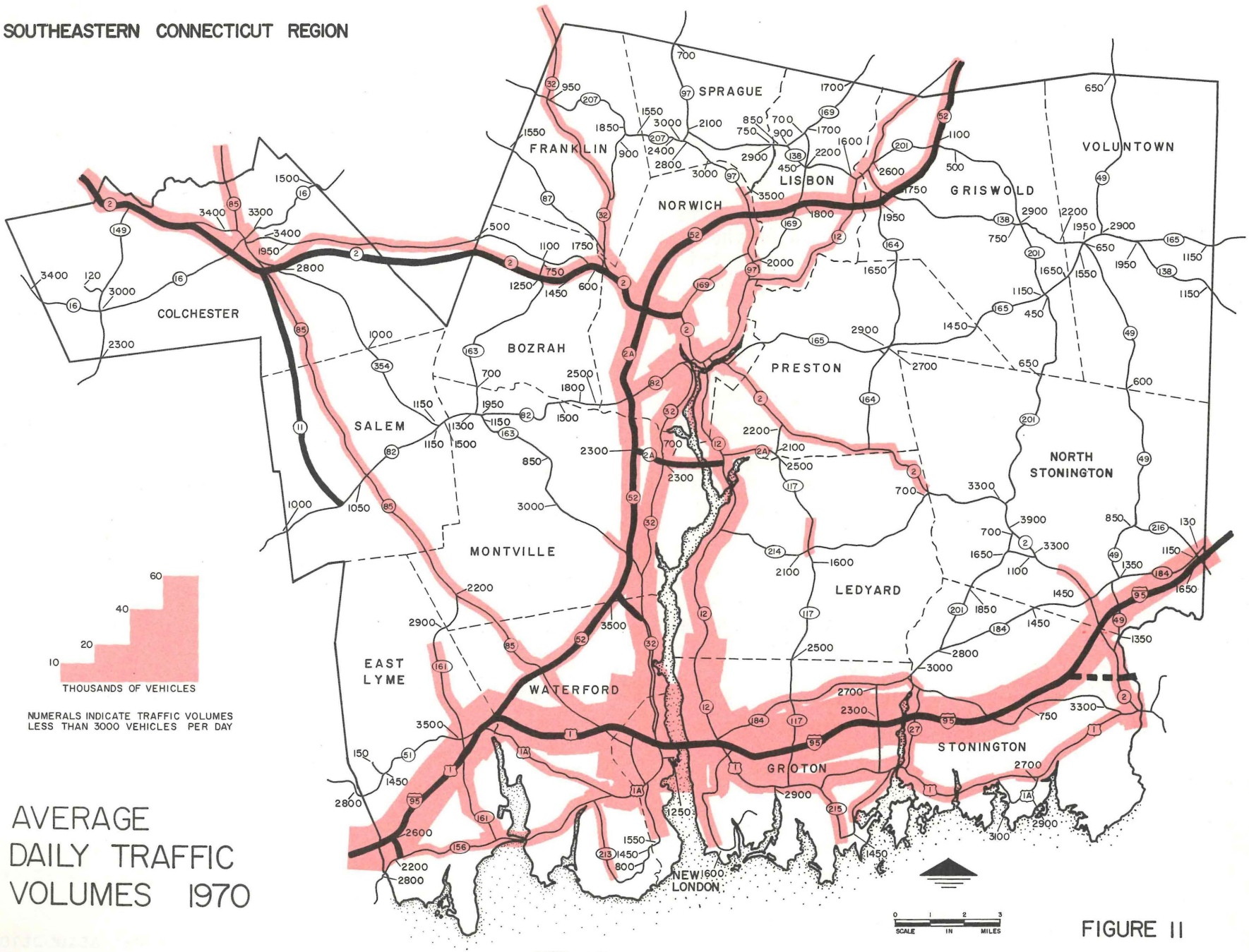

SOUTHEASTERN CONNECTICUT REGION
COLCHESTER
SALEM
BOZRAH
MONTVILLE
FRANKLIN
SPRAGUE
NORWICH
LISBON
VOLUNTOWN
GRISWOLD
PRESTON
NORTH STONINGTON
LEDYARD
EAST LYME
WATERFORD
GROTON
STONINGTON
NEW LONDON
60
40
20
10
THOUSANDS OF VEHICLES
NUMERALS INDICATE TRAFFIC VOLUMES LESS THAN 3000 VEHICLES PER DAY
AVERAGE DAILY TRAFFIC VOLUMES 1970
SCALE IN MILES
SCRPA 1975

FIGURE 11

TABLE 15

PERCENT OF DAILY AUTO DRIVER TRIPS
BY HOUR AND TRIP PURPOSE

Hour	Work (1)	Long (2)	Short (3)	Non Home Base (4)	All (Purp. 4)
1	1.3	1.7	.3	.4	.8
2	.1	.2	.0	.0	.1
3	.2	.0	.0	.0	.1
4	.3	.0	.0	.0	.1
5	1.0	.1	.2	.0	.4
6	8.0	.3	1.2	1.0	3.3
7	16.5	2.2	2.8	3.4	7.5
8	10.3	3.2	4.1	4.7	6.2
9	2.6	2.8	4.7	4.6	3.7
10	1.0	2.7	6.4	4.9	4.2
11	1.9	3.9	6.1	7.8	4.8
12	4.9	4.2	5.7	9.4	6.2
13	2.7	3.7	5.7	7.9	5.0
14	3.4	4.2	6.1	8.0	5.4
15	7.1	4.9	7.2	9.6	7.5
16	11.8	6.1	8.4	9.2	9.5
17	11.7	6.2	8.7	6.7	8.9
18	4.6	9.2	8.2	4.2	6.1
19	2.3	12.2	9.2	4.9	6.2
20	1.6	9.5	6.5	4.3	4.7
21	1.8	7.7	3.6	2.8	3.3
22	1.6	7.3	2.4	1.5	2.5
23	1.9	5.5	1.2	1.3	2.0
24	.4	1.0	.1	.3	.4

Source: Connecticut Department of Transportation Bureau of Planning and Research
CIPP Home Interview Data

such as green time available at signals, turning movements, amount of commercial traffic and peak hour flows. Load factors are applied to each assumption. All of these assumptions will not hold for each street or segment; however, a general pattern of capacity limitations can be determined by this method.

Highways with capacity deficiencies include State Routes 12, 32, 27, 156 at Niantic River bridge, Route 2 intersections in Norwich, and U.S. Route 1A.

There are also many places where localized capacity limitations prevail. In some cases, it may be possible to provide relief to different sections of highways by traffic operational improvements; however, lasting relief can be provided only by construction of added capacity at most locations or inducing a change in traffic patterns or inducing a shift from private cars to public transportation. Specific capacity deficiencies for each facility will be discussed later in this chapter.

4. Traffic Accidents

During the 5-year period from 1969 to 1973, there has been an increase in the number of accidents on certain highways in the region. The total number of accidents on the state-maintained highways for the 5-year period was 11,157. During the same period, 5,543 accidents occurred on the town-maintained roads. The total number of traffic accident fatalities was 178 on state highways and 56 on the town-maintained roads.

Table 16 indicates total accidents on each link of the state highway system during 1969 to 1973. The 5-year counts and the lengths of state highways in the region were used to compute the accident rates per mile of roadway. Since average volumes varied considerably over the 5-year period, the accident rates per vehicle mile were not computed.

Table 17 indicates the number of accidents on each town road during the years 1969 to 1973.

Figure 12 shows volumes of vehicle accidents on major state-maintained expressways and arterials per half-mile segments. Figure 13 indicates the

TABLE 16

SUMMARY OF ACCIDENTS ON MAJOR STATE HIGHWAYS
SOUTHEASTERN CONNECTICUT PLANNING REGION
1969-1973

Route #	Route miles in the Region	# of Total Accidents	# of Accidents Per Mile Length	# of Persons Killed	# of Persons Injured
1	14.61	1,081	73.9	6	740
1A	1.93	81	41.9	1	52
2	36.30	1,034	28.4	16	699
2A	6.00	41	6.8	-	13
12	23.43	1,477	6.3	16	1,038
16	9.71	106	10.9	9	63
27	3.22	110	34.1	-	74
32	23.44	1,294	55.2	15	916
49	18.69	47	2.5	1	35
51	4.48	92	20.5	-	61
52	25.86	309	11.9	5	161
82	13.61	435	31.9	5	313
85	20.93	512	24.4	9	391
87	4.05	24	5.9	-	14
95	27.99	1,537	54.9	46	1,026
97	29.16	171	5.8	4	124
117	11.39	143	12.5	3	80
138	17.75	140	7.8	4	119
148		0			
149	6.17	26	4.2	-	20
156	7.37	361	48.9	3	225
161	8.06	183	22.7	3	119
163	12.86	132	10.2	3	81
164	7.87	48	6	-	28
165	15.97	160	10	2	150
169	9.50	174	18.3	3	95
184	15.65	345	22	9	293
201	20.10	85	4.2	1	59
207	5.35	37	6.9	-	27
213	8.29	371	44.7	5	345
214	7.26	63	8.6	2	27
215	4.65	65	13.9	1	45
216	2.80	5	1.7	-	2
354	7.40	31	4.1	1	14
TOTAL	431.85	10,720	24.8	173	7,449

Source: Connecticut Department of Transportation.

number of vehicle accidents on town roads in each town of the region.

Accident costs are a valid justification for accident prevention measures. However, it is not possible from information now available to make calculations of the exact costs of accidents. They can only be approximated.

TABLE 17

SUMMARY OF ACCIDENTS ON TOWN ROADS, 1969 TO 1973

Town	Road Miles in the Town	# of Accidents	# of Accidents Per Mile	# of Persons Killed	# of Persons Injured
BOZRAH	33.26	34	1.0	-	20
COLCHESTER	85.43	80	0.9	-	53
EAST LYME	91.15	203	2.2	2	103
FRANKLIN	20.07	10	.5	-	10
GRISWOLD	66.19	65	.9	3	56
GROTON	115.13	1,109	9.6	14	682
LEDYARD	86.82	279	3.2	5	167
LISBON	24.71	34	1.3	-	42
MONTVILLE	103.84	490	4.7	4	252
NEW LONDON	62.90	509	8	8	351
NORTH STONINGTON	62.37	45	0.7	-	35
NORWICH	151.78	1,971	12.9	13	982
PRESTON	52.74	60	1.1	-	28
SALEM	34.12	28	0.8	-	19
SPRAGUE	24.59	58	2.3	3	43
STONINGTON	98.28	21	0.2	-	12
VOLUNTOWN	27.59	13	.4	1	10
WATERFORD	105.13	534	5.0	3	321
TOTAL	1,246.10	5,543	4.44	56	3,186

Source: Connecticut Department of Transportation.

The National Safety Council has estimated the calculable costs of motor vehicle accidents, such as wage loss, medical expense, insurance administrative costs, and property damage. The costs [These costs vary with area, age of a person, etc.] of all these items per case in 1973 were:

Death.....	$90,000
Non-fatal disability injury....	$ 3,700
Property damage accident..... (including minor injuries)	$ 500

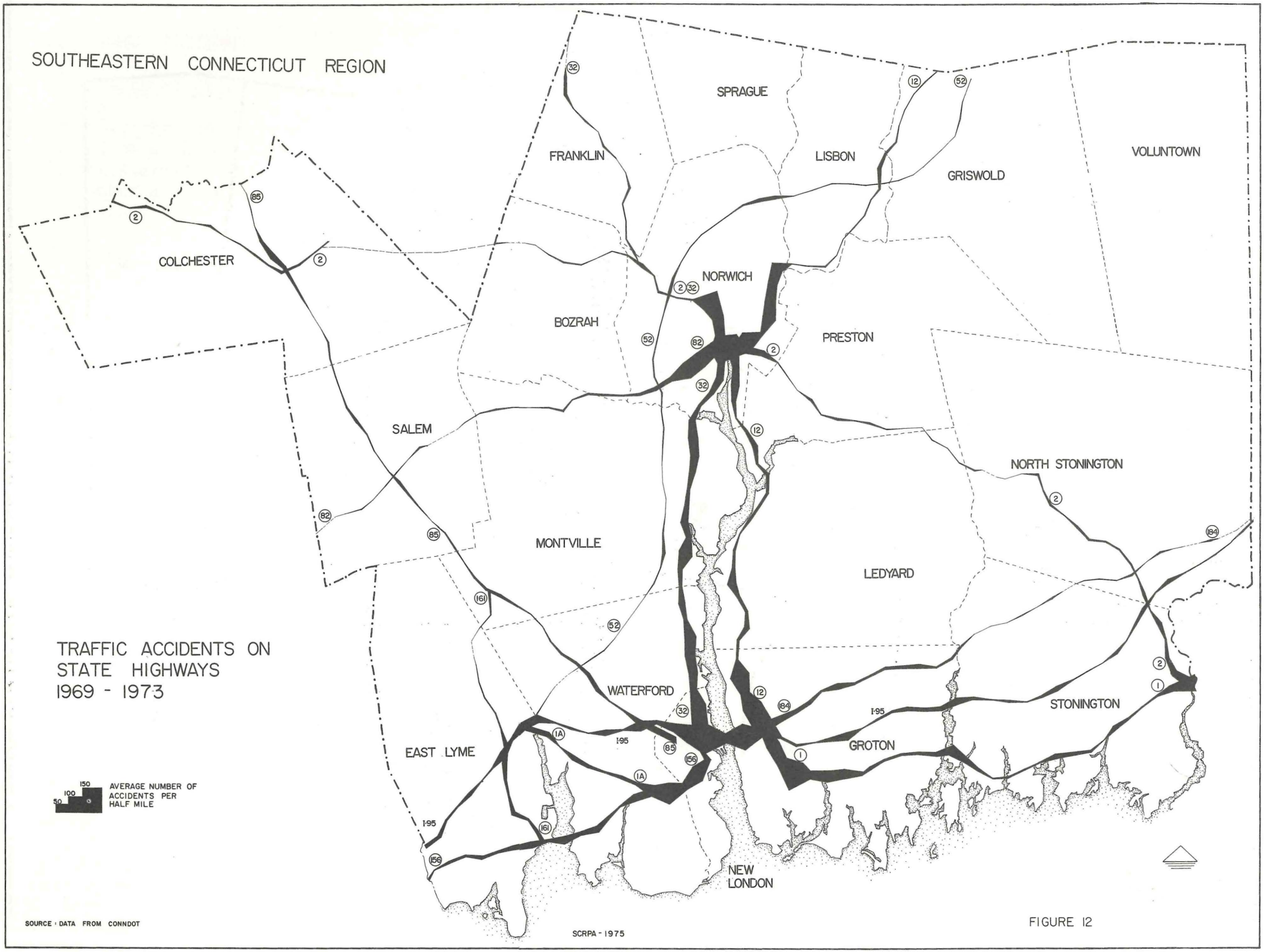
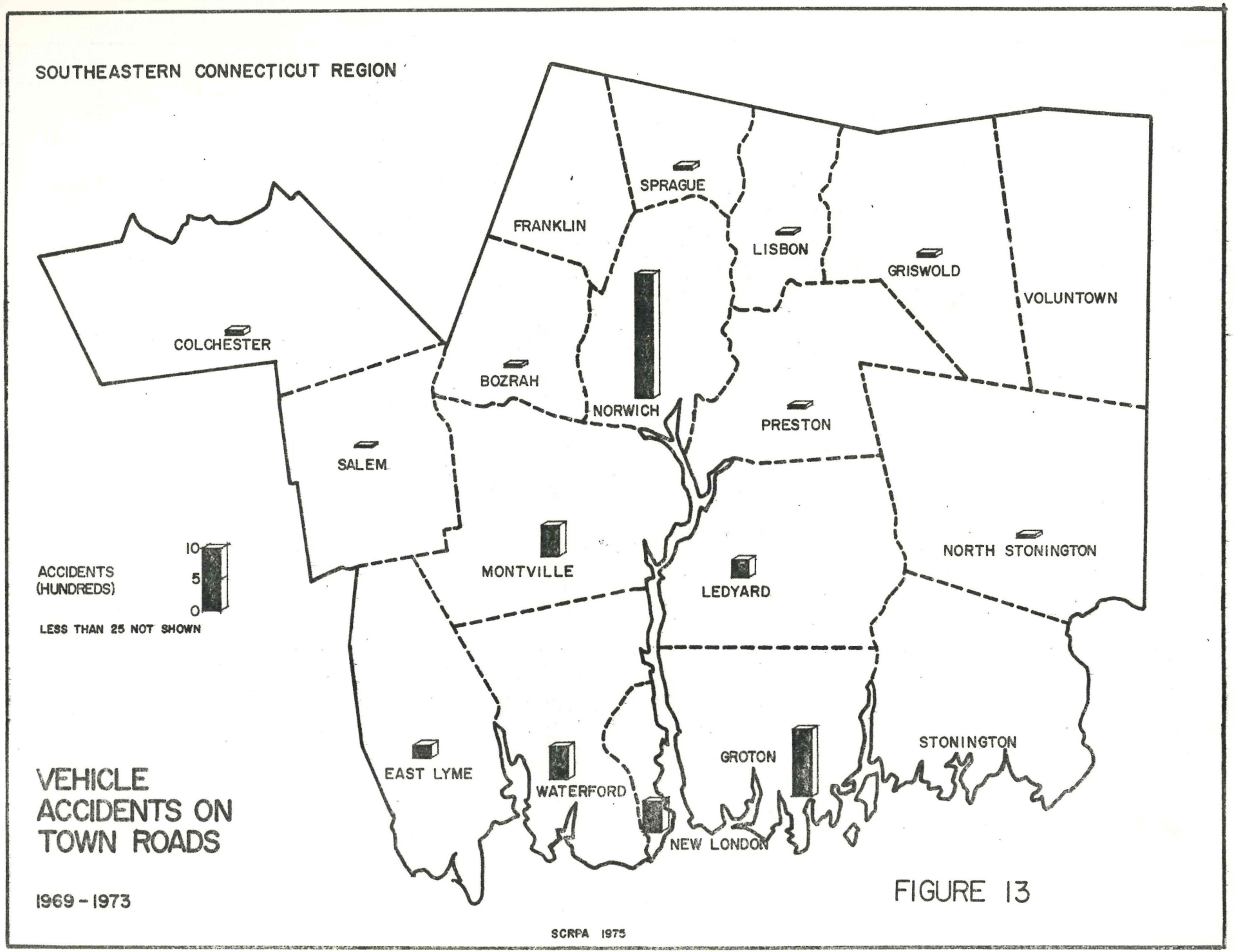

SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
FRANKLIN
LISBON
VOLUNTOWN
GRISWOLD
COLCHESTER
NORWICH
BOZRAH
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
WATERFORD
STONINGTON
GROTON
EAST LYME
NEW LONDON
I-95
TRAFFIC ACCIDENTS ON STATE HIGHWAYS 1969 - 1973
150
100
50
0
AVERAGE NUMBER OF ACCIDENTS PER HALF MILE
SOURCE : DATA FROM CONNDOT
SCRPA - 1975

FIGURE 12


SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
BOZRAH
NORWICH
PRESTON
SALEM
MONTVILLE
LEDYARD
NORTH STONINGTON
ACCIDENTS (HUNDREDS)
10
5
0
LESS THAN 25 NOT SHOWN
EAST LYME
WATERFORD
GROTON
STONINGTON
NEW LONDON
VEHICLE ACCIDENTS ON TOWN ROADS
1969 - 1973
FIGURE 13
SCRPA 1975

C. TRAVEL PATTERNS

1. Source of Data

In 1961, the Connecticut Highway Department, in co-operation with the U.S. Bureau of Public Roads and the Southeastern Connecticut Regional Planning Agency, conducted a study known as the Southeast Area Traffic Study (SEATS) in the southeastern part of the state.

The purpose of that study was to develop the basic data and planning analysis necessary to determine the location, design or improvement of present and future highway facilities in the area. This included identification of social, economic, and travel characteristics of the inhabitants of the study area.

The Southeast Area, as defined in the SEATS study, consisted of 23 towns and 8% of population of Connecticut at that time. In terms of area, it covered 795 square miles, or 16% of the state. For the purpose of this report, data was adjusted to reflect only the area of this 18-town planning region, and the information was updated to reflect changes that have occurred since the early 1960s.

Two basic tools used in the SEATS study to determine travel characteristics were the origin and destination (O and D) survey and home interviews.

The O and D survey was accomplished through roadside interviews of drivers of randomly selected automobiles and trucks. The purpose was to establish basic travel patterns of the region's traffic.

The home interviews were conducted on a random sample totalling 2 1/4% of the households in the study area. The purpose was to establish the number, purpose, and distribution of vehicle trips taken on an average day by area residents and to relate this information to various household characteristics.

2. Types of Data

The results of the SEATS study, analyzed along with similar studies conducted during the 1960s by the Connecticut Interregional Planning Program (CIPP) on a statewide basis, indicate the types of trips people take. These trips are divided into two major categories, as follows:

a. Home based trips - those trips that begin or end at home.

b. Non-home based trips - those trips which neither begin or end at home.

Trip data indicated numerous trip purposes, which, for the purpose of analysis and presentation, were grouped into four categories, shown below with their estimated time lengths:

I - Work trips	12.5 minutes
II - Long trips	12.4 minutes
III - Short trips	7.6 minutes
IV - Non-home based trips	8.1 minutes

The SEATS study also established a system of traffic zones according to which information was gathered on such subjects as land use, zoning, population, housing starts, economic activities, land characteristics, access, utilities, etc. These data are periodically updated.

3. Findings

Travel patterns, as determined by the O and D survey in Southeastern Connecticut, are dominated by the high proportion of short distance trips taken for purposes of work, school, shopping, and recreational activities. These trips distribute people broadly over the more densely urbanized areas. The trips are almost exclusively by automobile.

Table 18 depicts the intra-regional (town to town) travel pattern by automobile for the purpose of work for the year 1970 based on the Home Interview Survey (SEATS) referred to before.

Table 19 shows the intra-regional travel pattern for trucks in the Southeastern Connecticut Region for the year 1970. Table 20 shows the vehicular travel pattern (automobile and trucks) for all purposes for the year 1970.

D. TRIP GENERATION

In carrying out a comprehensive transportation planning study it is necessary to understand the relationship which exists between transportation and the land use of an area, as each is affected by the character of the other. For example, populous residential areas are likely to produce a large number of trips; likewise, industrial land areas generally will attract many trips.

1. Methodology

The transportation planner, in an attempt to supply rational measures in understanding the influence which various factors exercise on travel, has devised methods of measuring relationships, called mathematical equations, or "models." These models are developed by expressing in mathematical terms, past trends and present conditions derived from statistically processed inventories. The models are used to project and distribute the necessary elements for forecasting the amounts and characteristics of travel. The models are not ends in themselves, but rather are tools.

2. Traffic Distribution Model

All of the data gathered by small geographic areas called traffic zones are used in determining future trip estimates. Trips are then distributed from each zone for which trip ends have been measured to every other traffic zone. Through the model, there is established an interrelationship between the trips which are produced by zones, the trips that are attracted to zones, and the accessibility of zones in terms of time. Basically, the model recognizes the fact that there will be a greater interchange of trips between two zones that are relatively close together or have a greater mass, and that there will be less interchange of trips between zones which are farther apart or smaller in size.

3. Trip Productions and Attraction

In order to calibrate the model, it was necessary to use the actual trip production on a zonal basis, as determined through the home interview. This made it possible to distribute the actual trips by means of the model and then to compare the actual and model O and Ds.

The number of vehicle trips originating in any area depends directly on several factors, such as vehicle ownership, family income, family life, land use, trip purpose, and trip length. An attempt was made to determine and evaluate the characteristics having the greatest influence on trip production and allocation that could be feasibly obtained and also provide a reliable relationship.

Trip production tables for purpose I to V have been prepared for the year 1970 from the computerized data supplied by CONNDOT.

Tables 21 to 26 outline the trip productions and attractions in various towns of the region. Table 27 indicates that 761,323 vehicle trips (auto and truck) were projected for the year 1970. Out of this, 337,526 vehicle trips were projected local trips.

TABLE 18

INTRA-REGIONAL AUTOMOBILE TRAVEL PATTERN FOR WORK - 1970

Trip Attractions / Trip Productions	BOZRAH	COLCHESTER	EAST LYME	FRANKLIN	GRISWOLD	GROTON	LEDYARD	LISBON	MONTVILLE	NEW LONDON	NORTH STONINGTON	NORWICH	PRESTON	SALEM	SPRAGUE	STONINGTON	VOLUNTOWN	WATERFORD	TOTALS
BOZRAH	53	23	13	8	18	128	18	5	54	74	1	413	32	8	11	5	0	27	891
COLCHESTER	14	564	22	5	8	117	6	2	33	67	1	122	10	22	4	6	0	23	1,026
EAST LYME	6	21	494	2	7	1,135	25	2	128	882	3	136	22	12	4	44	0	355	3,278
FRANKLIN	12	12	5	98	9	54	6	3	15	29	1	152	11	2	41	3	0	10	463
GRISWOLD	31	22	24	11	934	269	43	63	70	142	20	1,007	189	4	84	21	57	48	3,039
GROTON	5	7	79	2	6	7,593	213	1	69	1,367	31	117	43	3	3	633	0	233	10,405
LEDYARD	10	7	30	3	15	2,107	571	3	65	453	30	324	177	2	7	253	1	81	4,139
LISBON	17	10	11	6	125	113	16	47	34	62	2	550	43	2	50	6	2	22	1,118
MONTVILLE	51	61	178	10	34	1,321	88	9	589	855	5	857	150	43	20	52	1	297	4,621
NEW LONDON	7	11	169	2	8	3,645	72	2	121	4,935	7	146	25	5	5	129	0	602	9,891
NORTH STONINGTON	2	2	9	1	17	549	58	1	12	120	213	94	62	1	3	260	2	22	1,428
NORWICH	207	106	141	59	366	1,530	263	106	528	813	27	8,779	667	22	217	83	9	305	14,228
PRESTON	9	5	13	3	35	260	71	5	53	77	12	406	205	1	9	22	3	28	1,217
SALEM	12	63	31	2	4	138	5	1	59	84	1	73	7	39	2	6	0	31	558
SPRAGUE	12	7	9	32	56	97	12	18	26	52	2	369	28	1	319	5	1	18	1,064
STONINGTON	2	4	34	1	4	2,683	140	1	29	537	84	64	29	2	2	1,400	0	94	5,110
VOLUNTOWN	3	3	3	1	147	42	10	5	7	17	8	111	56	0	7	7	39	5	471
WATERFORD	9	14	267	3	10	2,225	46	2	150	2,188	5	201	33	8	6	83	0	663	5,913
TOTALS:	462	942	1,532	249	1,803	24,006	1,663	276	2,042	12,754	453	13,921	1,789	177	794	3,018	115	2,864	68,860

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 19

INTRA-REGIONAL TRUCK TRAVEL PATTERN - 1970

Trip Productions \ Trip Attractions	BOZRAH	COLCHESTER	EAST LYME	FRANKLIN	GRISWOLD	GROTON	LEDYARD	LISBON	MONTVILLE	NEW LONDON	NORTH STONINGTON	NORWICH	PRESTON	SALEM	SPRAGUE	STONINGTON	VOLUNTOWN	WATERFORD	TOTALS
BOZRAH	91	9	5	5	10	7	9	7	38	7	1	117	11	7	5	1	-	9	339
COLCHESTER	7	686	8	3	3	5	2	2	20	5	1	22	2	21	2	2	-	6	797
EAST LYME	5	11	748	1	5	84	16	2	122	130	2	37	9	15	2	15	-	242	1,446
FRANKLIN	5	3	1	125	3	2	2	2	5	1	-	21	2	1	13	1	-	2	189
GRISWOLD	10	4	4	3	778	7	11	58	19	6	7	130	36	2	20	3	91	7	1,196
GROTON	12	12	157	4	13	5,016	461	6	173	791	59	100	55	13	6	754	1	399	8,032
LEDYARD	10	4	17	2	12	330	1,162	5	58	72	31	102	107	2	4	122	2	40	2,082
LISBON	7	3	2	2	67	4	5	127	13	3	1	114	10	1	19	1	2	5	386
MONTVILLE	39	26	120	7	22	93	54	13	1,014	119	4	243	76	54	10	17	1	164	2,076
NEW LONDON	10	10	183	2	9	589	92	5	168	3,322	11	72	19	12	4	89	1	844	5,442
NORTH STONINGTON	1	1	2	-	7	29	21	1	3	6	323	10	14	-	1	53	2	3	477
NORWICH	154	40	48	33	188	78	125	144	314	67	17	4,054	252	17	85	17	11	88	5,732
PRESTON	13	4	10	3	43	39	111	11	84	15	18	212	350	2	7	11	8	19	960
SALEM	6	24	13	1	1	6	2	1	47	7	-	11	2	86	1	1	-	9	218
SPRAGUE	4	1	2	12	17	2	3	14	7	2	1	49	5	-	253	1	1	3	377
STONINGTON	1	3	13	1	3	513	101	1	14	54	57	11	9	1	1	962	1	30	1,776
VOLUNTOWN	-	-	-	-	94	1	2	2	1	1	2	8	8	-	1	1	74	1	196
WATERFORD	10	10	267	2	9	247	42	5	190	700	5	77	19	12	4	41	1	939	2,580
TOTALS:	385	851	1,600	206	1,284	7,052	2,221	406	2,290	5,308	540	5,390	986	246	438	2,092	196	2,810	34,301

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 20

INTRA-REGIONAL VEHICULAR TRAVEL PATTERN (ALL PURPOSE) - 1970

Trip Attractions / Trip Productions	BOZRAH	COLCHESTER	EAST LYME	FRANKLIN	GRISWOLD	GROTON	LEDYARD	LISBON	MONTVILLE	NEW LONDON	NORTH STONINGTON	NORWICH	PRESTON	SALEM	SPRAGUE	STONINGTON	VOLUNTOWN	WATERFORD	TOTALS
BOZRAH	386	77	39	33	66	169	63	34	263	126	3	1,588	78	30	32	12	2	81	3,082
COLCHESTER	54	5,349	80	20	29	164	24	11	155	124	3	352	22	110	14	18	2	73	6,604
EAST LYME	33	113	7,005	10	39	2,065	146	14	1,159	2,955	13	564	64	79	18	167	2	3,077	17,523
FRANKLIN	43	36	15	841	29	72	21	14	57	49	2	450	22	5	156	7	1	27	1,847
GRISWOLD	88	59	62	31	5,939	341	123	464	212	218	48	2,775	379	10	227	44	559	114	11,693
GROTON	42	69	844	16	58	34,779	2,769	21	758	7,326	211	724	203	35	27	5,217	6	2,452	55,557
LEDYARD	71	43	193	19	98	6,320	10,300	33	573	1,553	174	1,851	753	11	36	1,617	13	511	24,169
LISBON	67	30	32	22	768	149	52	729	136	107	6	2,398	97	5	196	14	14	64	4,886
MONTVILLE	336	298	1,434	52	177	2,341	540	80	8,194	2,753	21	4,628	557	305	83	187	7	2,338	24,331
NEW LONDON	43	71	1,400	14	53	8,249	573	19	1,015	28,973	42	671	85	38	25	633	3	5,988	47,895
NORTH STONINGTON	7	9	29	3	66	970	251	7	40	222	1,469	281	144	2	9	1,033	15	63	4,620
NORWICH	972	366	466	236	1,560	2,085	1,047	860	2,546	1,418	82	44,303	1,683	73	737	198	59	932	59,623
PRESTON	60	23	61	13	212	468	601	45	482	182	58	2,272	1,147	7	37	72	34	134	5,908
SALEM	49	278	140	7	12	192	17	5	408	167	2	189	15	313	6	15	1	116	1,932
SPRAGUE	39	23	27	160	227	130	40	138	96	91	5	1,263	59	4	2,386	13	7	50	4,758
STONINGTON	9	22	158	5	21	8,045	1,037	5	138	1,353	355	205	65	7	8	9,966	4	411	21,814
VOLUNTOWN	7	7	8	3	737	57	30	25	20	28	19	280	109	1	18	15	511	14	1,889
WATERFORD	60	84	2,931	16	62	4,868	338	25	1,597	11,235	25	1,014	117	52	29	376	3	8,169	31,001
TOTALS:	2,366	6,957	14,924	1,501	10,153	71,464	17,972	2,529	17,849	58,880	2,538	65,808	5,599	1,087	4,044	19,604	1,243	24,614	329,132

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 21

TRIP TABLE, PURPOSE I - 1970
(WORK-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	1,032	549	53	1,085	602	1,687
COLCHESTER	1,940	1,216	564	2,504	1,780	4,284
EAST LYME	3,589	1,678	494	4,083	2,172	6,255
FRANKLIN	765	367	98	863	465	1,328
GRISWOLD	2,875	1,655	934	3,809	2,589	6,398
GROTON	3,289	21,175	7,593	10,882	28,768	39,650
LEDYARD	3,893	1,368	571	4,464	1,939	6,403
LISBON	1,284	321	47	1,331	368	1,699
MONTVILLE	4,739	1,884	589	5,328	2,473	7,801
NEW LONDON	5,444	10,010	4,935	10,379	14,945	25,324
NORTH STONINGTON	1,638	447	213	1,851	660	2,511
NORWICH	9,006	7,510	6,779	15,785	16,289	32,074
PRESTON	1,145	1,903	205	1,350	2,108	3,458
SALEM	790	211	39	829	250	1,079
SPRAGUE	1,022	752	319	1,341	1,071	2,412
STONINGTON	5,307	3,119	1,400	6,707	4,519	11,226
VOLUNTOWN	556	114	39	595	153	748
WATERFORD	5,813	2,884	663	6,476	3,549	10,025
TOTAL:	54,127	57,163	25,535	79,662	84,700	164,362

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 22

TRIP TABLE, PURPOSE II - 1970
(LONG-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	501	406	62	563	468	1,031
COLCHESTER	796	902	584	1,380	1,486	2,866
EAST LYME	1,675	1,486	615	2,290	2,101	4,391
FRANKLIN	359	236	102	461	338	799
GRISWOLD	1,123	1,000	669	1,792	1,669	3,461
GROTON	3,524	4,108	2,941	6,465	7,049	13,514
LEDYARD	2,105	1,516	1,016	3,121	2,532	5,653
LISBON	624	435	110	734	545	1,279
MONTVILLE	2,274	1,839	926	3,200	2,760	5,960
NEW LONDON	2,367	3,344	2,286	4,653	5,630	10,283
NORTH STONINGTON	966	623	179	1,145	802	1,947
NORWICH	2,595	3,273	3,880	6,475	7,153	13,628
PRESTON	764	1,338	281	1,045	1,619	2,664
SALEM	365	259	64	429	323	752
SPRAGUE	460	306	222	682	528	1,210
STONINGTON	3,007	2,374	512	3,519	2,886	6,405
VOLUNTOWN	247	194	67	314	261	575
WATERFORD	2,817	2,446	883	3,700	3,329	7,029
TOTAL:	26,569	26,085	15,399	41,968	41,479	83,447

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 23

TRIP TABLE, PURPOSE III - 1970
(SHORT-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	974	629	137	1,111	766	1,877
COLCHESTER	2,043	1,116	2,265	4,308	3,381	7,689
EAST LYME	4,931	3,687	3,452	8,383	7,139	15,522
FRANKLIN	748	304	377	1,125	681	1,806
GRISWOLD	2,342	1,599	2,400	4,742	3,999	8,741
GROTON	6,767	9,141	10,167	16,934	19,308	36,242
LEDYARD	5,791	2,190	5,375	11,166	7,565	18,731
LISBON	1,984	609	367	2,351	976	3,327
MONTVILLE	7,291	3,095	4,235	11,526	7,330	18,856
NEW LONDON	4,003	11,682	9,570	13,573	21,252	34,825
NORTH STONINGTON	2,196	251	590	2,786	841	3,627
NORWICH	2,915	9,578	15,225	18,140	24,803	42,943
PRESTON	2,081	683	255	2,336	938	3,274
SALEM	870	202	106	976	308	1,284
SPRAGUE	982	461	1,136	2,118	1,597	3,715
STONINGTON	7,171	5,108	4,371	11,542	9,479	21,021
VOLUNTOWN	684	263	251	935	514	1,449
WATERFORD	9,332	6,315	3,957	13,289	10,272	23,561
TOTAL:	63,105	56,913	64,236	127,341	121,149	248,490

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 24

TRIP TABLE, PURPOSE IV - 1970
(NON-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	519	501	43	562	544	1,106
COLCHESTER	1,563	1,230	1,250	2,813	2,480	5,293
EAST LYME	3,729	3,193	1,696	5,425	4,889	10,314
FRANKLIN	522	349	140	662	489	1,151
GRISWOLD	1,721	1,453	1,159	2,880	2,612	5,492
GROTON	8,177	7,580	9,062	17,239	16,642	33,881
LEDYARD	3,340	2,621	2,176	5,516	4,797	10,313
LISBON	734	486	77	811	563	1,374
MONTVILLE	3,777	3,107	1,431	5,208	4,538	9,746
NEW LONDON	7,719	7,106	8,861	16,580	15,967	32,547
NORTH STONINGTON	629	382	165	794	547	1,341
NORWICH	6,270	4,992	12,365	18,635	17,357	35,992
PRESTON	696	551	56	752	607	1,359
SALEM	237	182	19	256	201	457
SPRAGUE	751	574	456	1,207	1,030	2,237
STONINGTON	4,699	3,882	2,721	7,420	6,603	14,023
VOLUNTOWN	241	210	79	320	289	609
WATERFORD	6,228	5,194	1,727	7,955	6,921	14,876
TOTAL:	51,552	43,593	43,483	95,035	87,076	182,111

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 25

TRIP TABLE, PURPOSE V - 1970
(TRUCKS)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	397	407	91	488	498	986
COLCHESTER	638	605	686	1,324	1,291	2,615
EAST LYME	1,247	1,221	748	1,995	1,969	3,964
FRANKLIN	217	212	125	342	337	679
GRISWOLD	859	870	778	1,637	1,648	3,285
GROTON	4,382	2,501	5,016	9,398	7,517	16,915
LEDYARD	1,327	1,286	1,162	2,489	2,448	4,937
LISBON	398	379	127	525	506	1,031
MONTVILLE	1,585	1,626	1,014	2,599	2,640	5,239
NEW LONDON	2,841	2,298	3,322	6,163	5,620	11,783
NORTH STONINGTON	517	505	323	840	828	1,668
NORWICH	2,893	2,004	4,054	6,947	6,058	13,005
PRESTON	852	787	350	1,202	1,137	2,339
SALEM	240	244	86	326	330	656
SPRAGUE	274	333	253	527	586	1,113
STONINGTON	1,945	2,084	962	2,907	3,046	5,953
VOLUNTOWN	186	172	74	260	246	506
WATERFORD	2,186	2,175	939	3,125	3,114	6,239
TOTAL:	22,984	19,709	20,110	43,094	39,819	82,913

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 26

TRIP TABLE, ALL PURPOSE - 1970

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	3,423	2,492	386	3,809	2,878	6,687
COLCHESTER	6,980	5,069	5,349	12,329	10,418	22,747
EAST LYME	15,171	11,265	7,005	22,176	18,270	40,446
FRANKLIN	2,612	1,468	841	3,453	2,309	5,762
GRISWOLD	8,921	6,577	5,939	14,860	12,516	27,376
GROTON	26,139	44,505	34,779	60,918	79,284	140,202
LEDYARD	16,455	8,981	10,300	26,755	19,281	46,036
LISBON	5,023	2,229	729	5,752	2,958	8,710
MONTVILLE	19,667	11,546	8,194	27,861	19,740	47,601
NEW LONDON	22,375	34,441	28,973	51,348	63,414	114,762
NORTH STONINGTON	5,947	2,208	1,469	7,416	3,677	11,093
NORWICH	21,679	27,357	44,303	65,982	71,660	137,642
PRESTON	5,538	5,262	1,147	6,685	6,409	13,094
SALEM	2,503	1,098	313	2,816	1,411	4,227
SPRAGUE	3,489	2,426	2,386	5,875	4,812	10,687
STONINGTON	22,129	16,567	9,966	32,095	26,533	58,628
VOLUNTOWN	1,913	952	511	2,424	1,463	3,887
WATERFORD	26,378	19,015	8,169	34,547	27,184	61,731
TOTAL:	216,342	203,458	170,759	387,101	374,217	761,318

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 27

INTRAREGIONAL VEHICULAR TRIP PRODUCTIONS AND ATTRACTIONS BY PURPOSE - 1970

Purpose	Trips Intratown	Trip Productions	Trip Attractions	Productions & Attractions	% of the Total Trips
Work Home Based	51,070	79,662	84,700	164,362	21.58
Long Home Based	30,798	41,968	41,479	83,447	10.97
Short Home Based	128,472	127,341	121,149	248,490	32.63
Non-Home Based	86,966	95,035	87,076	182,111	23.92
Trucks	40,220	43,094	39,819	82,913	10.9
All Purpose	337,526	387,100	374,223	761,323	-

Source: Developed from Connecticut Department of Transportation Data.

E. ANALYSIS OF TRAVEL CHARACTERISTICS

Current travel patterns and their relationship with land use, income level, car ownership, and other socioeconomic factors have been established to serve as a base for travel projections. Trip length, production and attraction characteristics are generally dependent on trip purpose. Trip frequency and trip purpose vary with different income and car ownership levels. Accordingly, one of the most important pieces of information obtained in the origin-destination survey is trip purpose.

Trip production and attraction are determined by the type and intensity of land use in various zones. Employment centers attract work trips on the basis of the number of jobs available, while work trips are produced in accordance with the size of the labor force residing in a zone.

Similar relationships can be established for other trip purposes. Trip interchange between zones by trip purpose categories may then be combined to establish the total travel pattern. The trip making pattern of motorists is complex; therefore, a complete analysis is necessary for reliable travel projections.

1. Intraregional Trip Productions and Attractions

Figure 14 indicates auto trips produced in each of the towns in the region for the purpose of work in 1970. Figure 15 indicates the vehicle trips (auto and truck) produced in each of the towns for all purposes for the year 1970. Figure 16 indicates the auto trips attracted for the purpose of work in the various towns for the year 1970. Figure 17 indicates the vehicle (auto and truck) trips attracted for all purposes in the various towns. In essence, Figures 14 to 17 indicate the trip ends of production and attraction in the Southeastern Connecticut Region.

2. Interregional Trips

The urbanized area of the region, especially Norwich, New London and Groton, also attracts sizeable trips from outside of the region for the purpose of work, recreation, and shopping, but data was not available for this study in a form that permitted analysis without the aid of computers.

3. External - External (through) Trips

A sizeable amount of traffic in the region passes through on the regional arteries, especially I-95, an interstate highway which is used for access to the rest of New England from points west and south. Some impact from the Hartford-Springfield areas has also been felt on summer weekends from recreational traffic as people travel to Rhode Island beaches. Insufficient data on this traffic is available from CONNDOT for a meaningful analysis.

4. Base - Year Travel Desires - 1970

Analysis of travel desires was made for a typical weekday by the expansion of data from the previous O and D survey. Desire line charts for the various

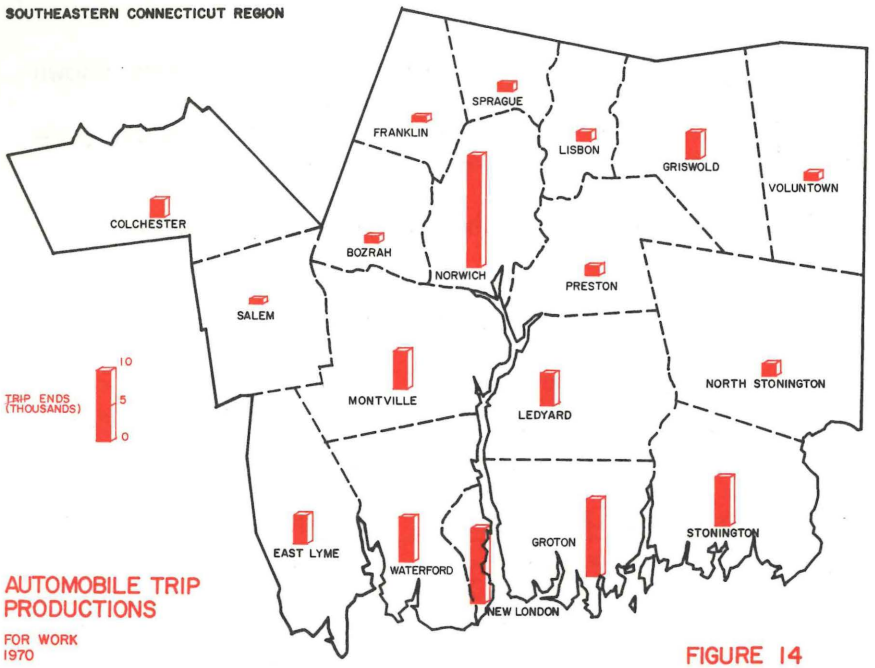


FIGURE 14

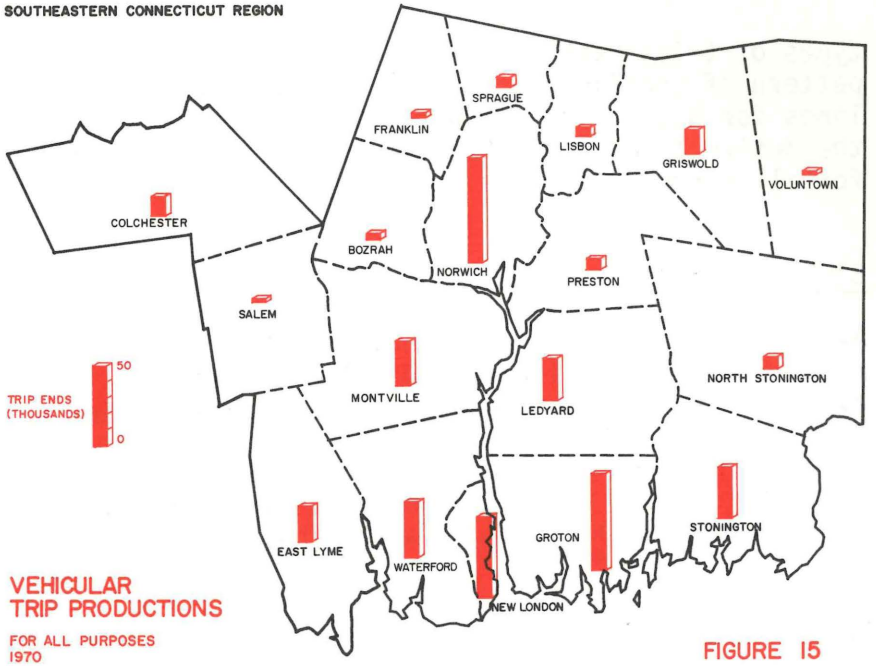


FIGURE 15

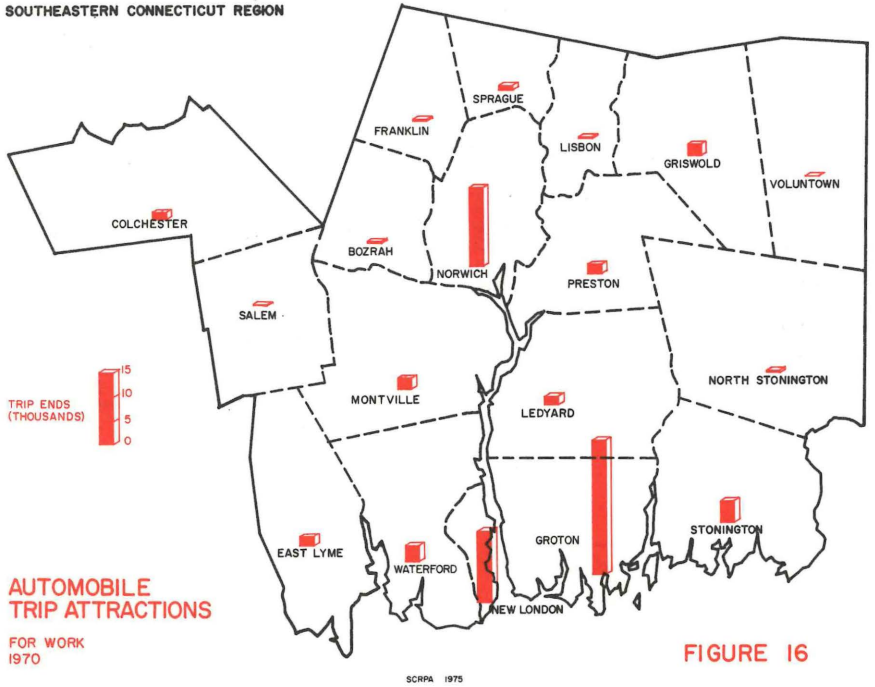


FIGURE 16

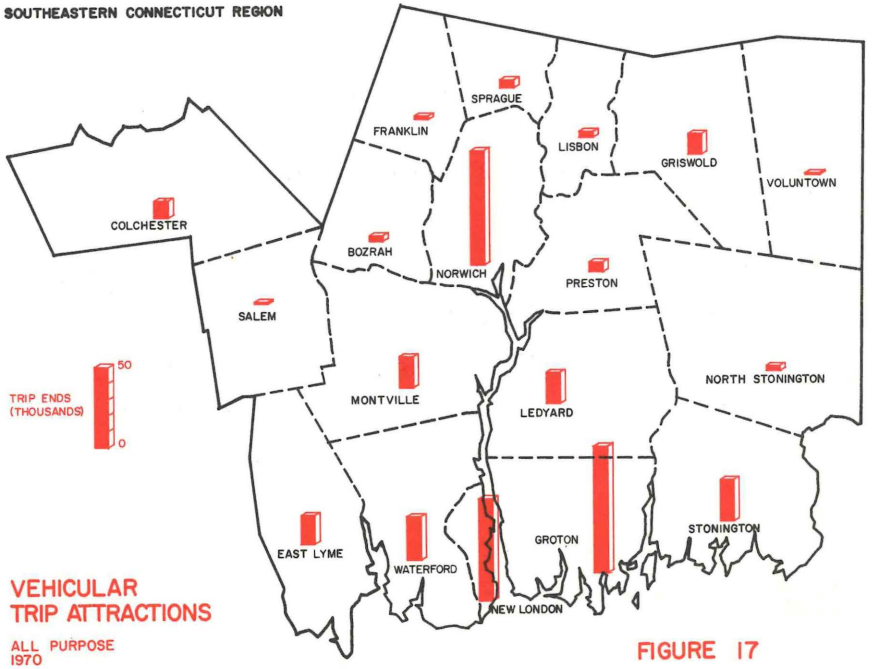


FIGURE 17

types of trips have been prepared to illustrate the pattern of traffic demands. Figure 18 depicts desire lines for auto trips for work, and Figure 19 shows the desire lines for vehicular trips (auto and truck) for all purposes for the year 1970.

5. Vehicle Occupancy

Average passenger car occupancy for this area for trips made within the region is indicated in Table 28. The average automobile occupancy, including the driver was 1.81 persons. The average occupancy factors for internal travel ranged from a low of 1.46 persons per vehicle for work trips to a high of 2.10 persons per vehicle for the purpose of long trips.

6. Trip Length

The length of individual trips made by an automobile for different trip purposes is an important characteristic of urban travel. Trip length data are shown in Figures 20 to 23. The trip lengths minutes, represent the minimum time path between zone centroids, excluding incidental stops.

Table 29 indicates that the average trip length in

TABLE 28

CAR OCCUPANCY, 1962

Purpose	Car Occupancy
I, Work Trips, Home-based	1.46
II, Long Trips, Home-based	2.10
III, Short Trips, Home-based	1.99
IV, Non-home Based Trips	1.82
I-IV	1.81

Source: SEATS Study

TABLE 29

AVERAGE TRIP LENGTHS (ATL) - STATEWIDE

	1970		
Purpose	Trip Productions	ATL Minutes	ATL Miles
Work	1,231,213	15.0	8.4
Long	687,543	16.7	10.5
Short	1,850,458	9.0	4.9
NHB*	1,519,490	11.7	6.4
Truck	582,259	13.4	8.1
TOTAL:	5,870,963	12.3	7.0
	1980		
Work	1,418,547	15.3	8.9
Long	850,731	17.5	10.9
Short	2,398,866	9.1	5.1
NHB*	1,916,805	12.0	6.8
Truck	688,359	14.1	8.9
TOTAL:	7,273,308	12.5	7.3

* Non-home based.

Source: CONNDOT, based on statewide data.

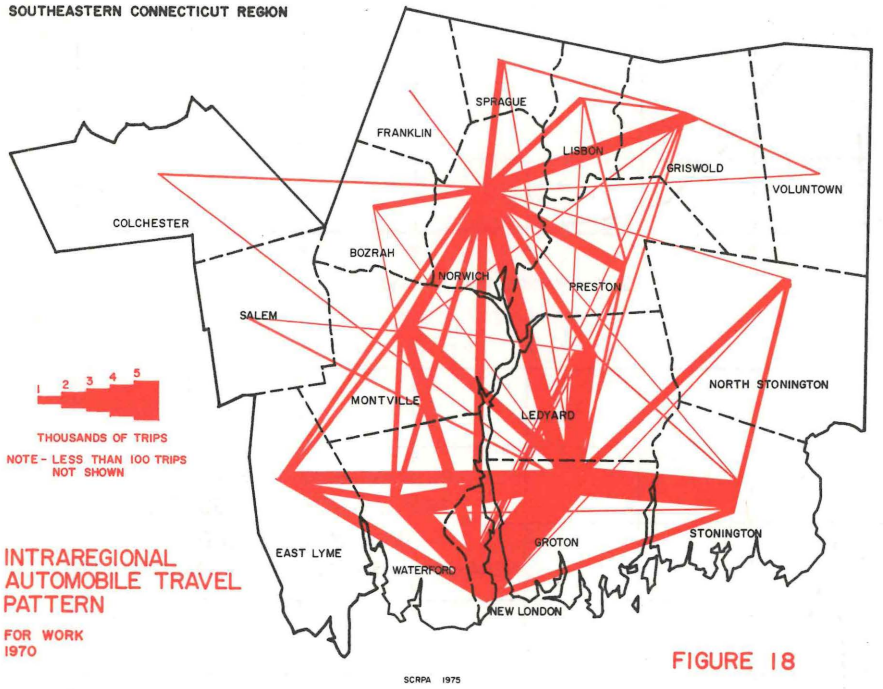


FIGURE 18

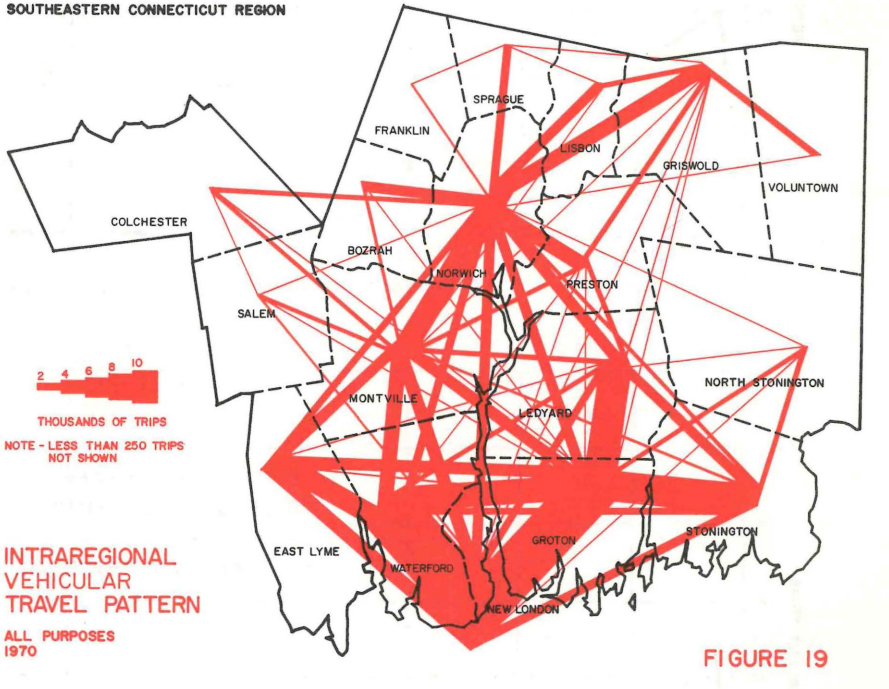


FIGURE 19

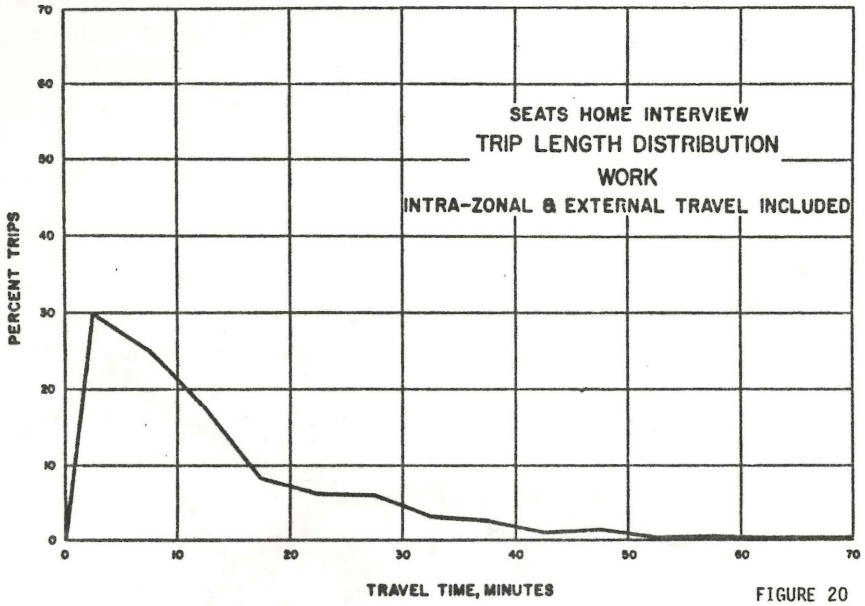


FIGURE 20

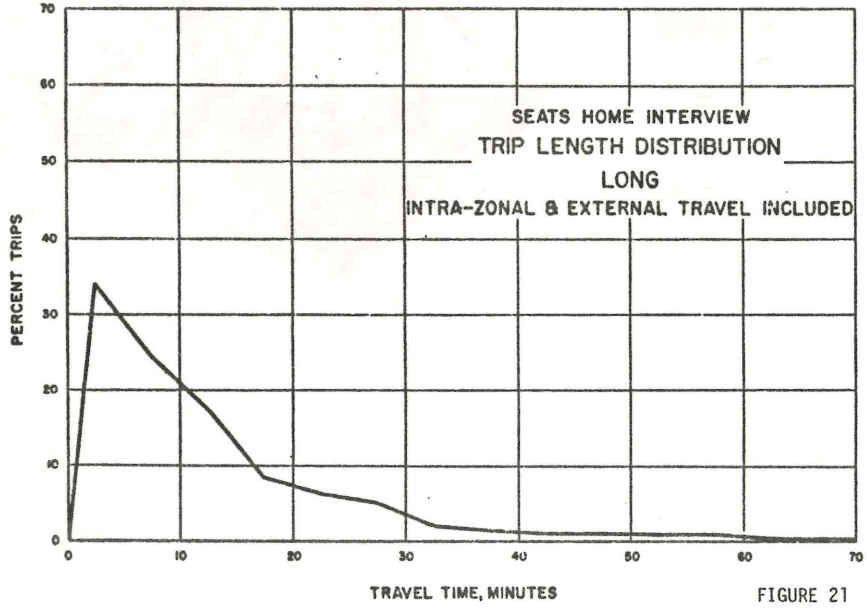


FIGURE 21

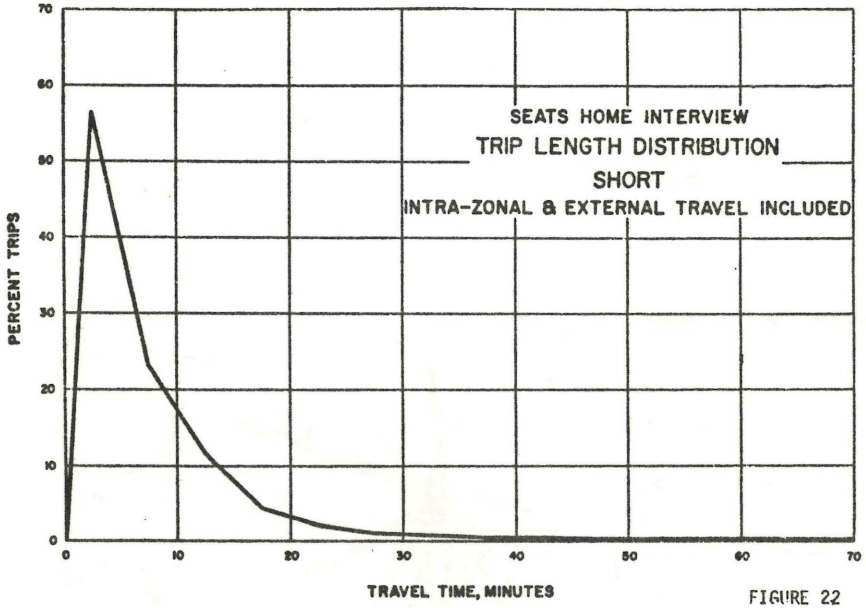


FIGURE 22

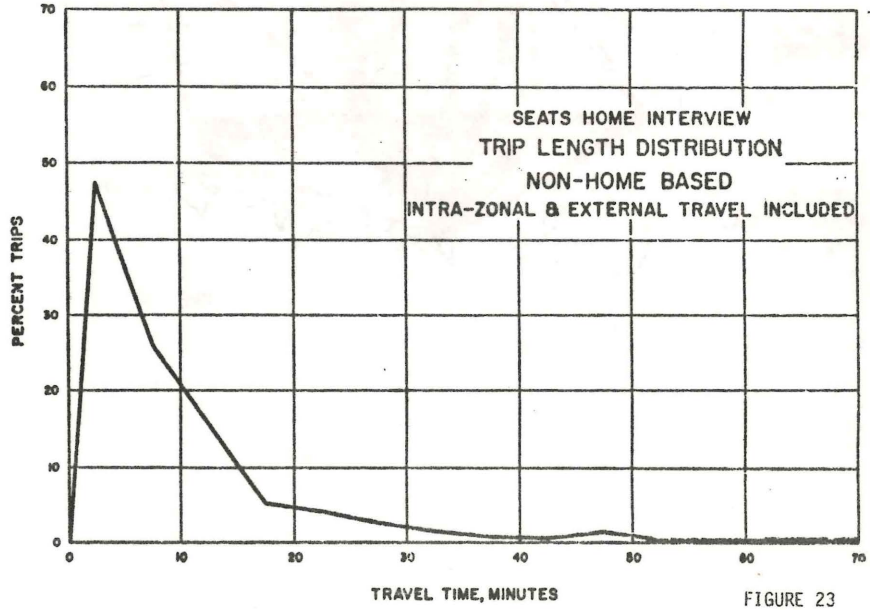


FIGURE 23

1970 for all vehicle trips on a typical weekday was 12.3 minutes or 7.0 miles. The average trip length for work was 8.4 miles, or 15 minutes. The average trip length for trucks was 13.4 minutes, or 8.1 miles.

The average trip length forecasted for 1980 for an automobile is 12.5 minutes, or 7.3 miles and for 1990 is 13.17 minutes, or 7.4 miles.

7. Trip Purposes

In the SEATS Home Interview Survey, trip characteristics were classified into 11 basic trip purposes that have one trip end at home (home based) and twelfth category where both trip ends are non-home based. For purposes of simplification, the categories have been consolidated in this report into 6 principal categories and one miscellaneous category. Occupancy factors were calibrated for these trip purposes.

A total of 1,211,860 auto person-trips were generated in 1970 within the region on a typical weekday. Trips made by other modes of transportation, such as bus, rail and ferry, have not been taken into account as no data was available, but the number of trips on other modes was negligible as compared to auto travel.

Table 30 indicates the principal trip purposes, modified occupancy factors, auto and person travel.

TABLE 30

AUTO AND PERSON TRIPS - 1970

	Purpose	Auto	Occupancy Factor	Person Travel	% (Auto)	% (Person Travel)
1.	Work	200,784	1.22	244,956	29.59	20.21
2.	Pers., Bus., Med. & Dent.	101,088	1.98	200,154	14.90	16.52
3.	Education	11,501	1.65	18,977	1.69	1.57
4.	Social, Civic, Religious	70,975	2.1	149,048	10.46	12.30
5.	Recreation	25,990	2.5	64,975	3.83	5.36
6.	Shopping	130,102	1.99	258,903	19.17	21.36
	Others	138,114	1.99	274,847	20.35	22.68
	TOTAL:	678,554	1.78	1,211,860		

Source: Connecticut Department of Transportation.

F. TRAVEL FORECAST - 1990

Data collected in the O and D surveys for the SEATS Study and the Regional Development Plan served as the base of information about traffic patterns and development in the Southeastern Connecticut Planning Region. Regression analyses were used to correlate existing levels of trip productions and attractions to land use and other planning data.

Land use and socio-economic data were projected statewide to 1990 and were subsequently applied to the traffic distribution model as independent variables to determine future trip ends by purpose for the auto travel mode and trucks. The model was used to link the trip ends predicted by trip purpose for each traffic zone. Following the trip distribution, the 1990 town-to-town trip interchanges were available for assignment to various proposed street networks.

1. Projections of Intraregional Travel

Projected 1990 vehicular trip productions and attractions by major purpose categories are shown in Tables 31 to 36. Rural and suburban towns are expected to experience substantial increases in trip productions by 1990 because of development trends outward from the central cities. However, the energy constraints might change the pace of development, and a trend towards mass transit would help influence development locations around mass transit corridors. Tables 37 to 39 show the intra-regional vehicular travel patterns for the various categories of trip purpose for 1990.

TABLE 31

TRIP TABLE, PURPOSE I - 1990
(WORK-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	1,738	1,256	143	1,881	1,399	3,280
COLCHESTER	2,864	2,850	1,133	3,997	3,983	7,980
EAST LYME	4,902	2,983	859	5,761	3,842	9,603
FRANKLIN	987	471	114	1,101	585	1,686
GRISWOLD	3,679	2,013	1,095	4,774	3,108	7,882
GROTON	4,417	22,802	7,202	11,619	30,004	41,623
LEDYARD	5,011	2,439	1,057	6,068	3,496	9,564
LISBON	2,071	800	152	2,223	952	3,175
MONTVILLE	6,399	3,404	1,067	7,466	4,471	11,937
NEW LONDON	6,426	11,428	4,959	11,385	16,387	27,772
NORTH STONINGTON	3,040	1,933	1,104	4,144	3,037	7,181
NORWICH	10,277	8,743	9,888	20,165	18,631	38,796
PRESTON	1,483	2,754	292	1,775	3,046	4,821
SALEM	1,290	539	107	1,397	646	2,043
SPRAGUE	1,695	875	475	2,170	1,350	3,520
STONINGTON	7,263	4,414	2,248	9,511	6,662	16,173
VOLUNTOWN	685	198	62	747	260	1,007
WATERFORD	8,365	5,604	1,546	9,911	7,150	17,061
TOTAL:	72,592	75,506	33,503	106,095	109,009	215,104

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 32

TRIP TABLE, PURPOSE II - 1990
(LONG-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	908	837	153	1,061	990	2,051
COLCHESTER	1,390	1,727	1,042	2,432	2,769	5,201
EAST LYME	2,522	2,311	908	3,430	3,219	6,649
FRANKLIN	446	360	125	571	485	1,056
GRISWOLD	1,683	1,403	837	2,520	2,240	4,760
GROTON	4,340	5,018	2,545	6,885	7,563	14,448
LEDYARD	3,082	2,267	1,491	4,573	3,758	8,331
LISBON	976	810	221	1,197	1,031	2,228
MONTVILLE	3,399	2,805	1,402	4,801	4,207	9,008
NEW LONDON	2,960	4,033	2,184	5,144	6,217	11,361
NORTH STONINGTON	1,935	1,729	552	2,487	2,281	4,768
NORWICH	3,709	4,361	4,287	7,996	8,648	16,644
PRESTON	1,112	1,973	414	1,526	2,387	3,913
SALEM	584	524	128	712	652	1,364
SPRAGUE	700	554	408	1,108	962	2,070
STONINGTON	4,406	3,598	835	5,241	4,433	9,674
VOLUNTOWN	347	290	90	437	380	817
WATERFORD	4,553	3,863	1,710	6,263	5,573	11,836
TOTAL:	39,052	38,463	19,332	58,384	57,795	116,179

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 33

TRIP TABLE, PURPOSE III - 1990
(SHORT-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	2,573	2,270	774	3,347	3,044	6,391
COLCHESTER	4,100	2,635	4,922	9,022	7,557	16,579
EAST LYME	7,763	6,841	5,729	13,492	12,570	26,062
FRANKLIN	1,144	447	476	1,620	923	2,543
GRISWOLD	4,181	2,512	3,817	7,998	6,329	14,327
GROTON	8,883	11,516	9,910	18,793	21,426	40,219
LEDYARD	8,275	3,974	9,392	17,667	13,366	31,033
LISBON	3,266	1,813	1,160	4,426	2,973	7,399
MONTVILLE	10,984	6,360	7,726	18,710	14,086	32,796
NEW LONDON	5,877	14,268	9,871	15,748	24,139	39,887
NORTH STONINGTON	4,532	1,663	4,259	8,791	5,922	14,713
NORWICH	5,941	13,672	18,918	24,859	32,590	57,449
PRESTON	3,739	1,581	748	4,487	2,329	6,816
SALEM	1,740	860	508	2,248	1,368	3,616
SPRAGUE	1,813	807	2,211	4,024	3,018	7,042
STONINGTON	14,383	7,896	4,880	19,263	16,376	35,639
VOLUNTOWN	1,131	412	357	1,488	769	2,257
WATERFORD	15,625	11,082	9,156	24,781	20,238	45,019
TOTAL:	105,950	90,609	94,814	200,764	189,023	389,787

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 34

TRIP TABLE, PURPOSE IV - 1990
(NON-HOME BASED)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	2,081	1,740	352	2,433	2,092	4,525
COLCHESTER	3,776	2,822	2,723	6,499	5,545	12,044
EAST LYME	6,735	5,742	2,994	9,729	8,736	18,465
FRANKLIN	714	480	147	861	627	1,488
GRISWOLD	3,027	2,237	1,756	4,783	3,993	8,776
GROTON	10,000	9,686	8,374	18,374	18,060	36,434
LEDYARD	5,765	4,381	4,175	9,940	8,556	18,496
LISBON	1,916	1,420	398	2,314	1,818	4,132
MONTVILLE	7,402	5,944	3,125	10,527	9,069	19,596
NEW LONDON	9,860	9,425	8,642	18,502	18,067	36,569
NORTH STONINGTON	2,703	1,943	1,863	4,566	3,806	8,372
NORWICH	9,850	8,373	13,972	23,822	22,345	46,167
PRESTON	1,643	1,228	194	1,837	1,422	3,259
SALEM	975	759	162	1,137	921	2,058
SPRAGUE	1,327	995	860	2,187	1,855	4,042
STONINGTON	7,489	6,032	5,030	12,519	11,062	23,581
VOLUNTOWN	439	309	105	544	414	958
WATERFORD	11,850	9,352	4,398	16,248	13,750	29,998
TOTAL:	87,552	72,868	59,270	146,822	132,138	278,960

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 35

TRIP TABLE, PURPOSE V - 1990
(TRUCKS)

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	741	696	191	932	887	1,819
COLCHESTER	1,128	1,070	1,147	2,275	2,217	4,492
EAST LYME	1,874	1,740	1,071	2,945	2,811	5,756
FRANKLIN	300	278	145	445	423	868
GRISWOLD	1,201	1,129	893	2,094	2,022	4,116
GROTON	5,237	3,040	4,822	10,059	7,862	17,921
LEDYARD	1,935	1,741	1,622	3,557	3,363	6,920
LISBON	682	607	254	936	861	1,797
MONTVILLE	2,378	2,278	1,459	3,837	3,737	7,574
NEW LONDON	3,544	2,750	3,299	6,843	6,049	12,892
NORTH STONINGTON	1,078	1,007	981	2,059	1,988	4,047
NORWICH	3,870	2,775	4,534	8,404	7,309	15,713
PRESTON	1,225	1,087	483	1,708	1,570	3,278
SALEM	429	403	164	593	567	1,160
SPRAGUE	475	482	409	884	891	1,775
STONINGTON	2,722	2,680	1,530	4,252	4,210	8,462
VOLUNTOWN	258	228	91	349	319	668
WATERFORD	3,354	3,197	1,655	5,009	4,852	9,861
TOTAL:	32,431	27,188	24,750	57,181	51,938	109,119

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 36

TRIP TABLE, ALL PURPOSE - 1990

Towns	Trips Exiting	Trips Entering	Trips Intratown	Trip Productions	Trip Attractions	Trip Productions and Attractions
BOZRAH	8,041	6,799	1,613	9,654	8,412	18,066
COLCHESTER	13,258	11,104	10,967	24,225	22,071	46,296
EAST LYME	23,795	19,619	11,562	35,357	31,181	66,538
FRANKLIN	3,591	2,035	1,007	4,598	3,042	7,640
GRISWOLD	13,772	9,294	8,397	22,169	17,691	39,860
GROTON	32,878	52,062	32,852	65,730	84,914	150,644
LEDYARD	24,068	14,802	17,737	41,805	32,539	74,344
LISBON	8,911	5,450	2,185	11,096	7,635	18,731
MONTVILLE	30,562	20,791	14,779	45,341	35,570	80,911
NEW LONDON	28,668	41,903	28,954	57,622	70,857	128,479
NORTH STONINGTON	13,288	8,276	8,759	22,047	17,035	39,082
NORWICH	33,647	37,924	51,599	85,246	89,523	174,769
PRESTON	9,202	8,623	2,131	11,333	10,754	22,087
SALEM	5,018	3,085	1,069	6,087	4,154	10,241
SPRAGUE	6,010	3,714	4,363	10,373	8,077	18,450
STONINGTON	32,663	24,620	18,123	50,786	42,743	93,529
VOLUNTOWN	2,859	1,437	706	3,565	2,143	5,708
WATERFORD	43,746	33,098	18,466	62,212	51,564	113,776
TOTAL:	333,977	304,636	235,269	569,246	539,905	1,109,151

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 37

INTRA-REGIONAL PROJECTED AUTOMOBILE TRAVEL PATTERN FOR WORK - 1990

Trip Productions \ Trip Attractions	BOZRAH	COLCHESTER	EAST LYME	FRANKLIN	GRISWOLD	GROTON	LEDYARD	LISBON	MONTVILLE	NEW LONDON	NORTH STONINGTON	NORWICH	PRESTON	SALEM	SPRAGUE	STONINGTON	VOLUNTOWN	WATERFORD	TOTALS
BOZRAH	143	85	26	14	28	154	37	17	115	95	4	589	56	22	17	9	1	65	1,477
COLCHESTER	39	1,133	40	8	11	114	13	6	58	70	3	179	17	52	7	8	0	46	1,804
EAST LYME	16	59	859	3	10	1,195	44	5	245	958	13	166	33	36	5	63	-	688	4,398
FRANKLIN	23	26	7	114	10	47	9	6	24	26	2	156	13	4	44	3	-	16	530
GRISWOLD	64	60	37	14	1,095	241	68	149	112	135	45	1,048	245	9	93	26	98	84	3,623
GROTON	10	18	130	2	8	7,202	350	3	116	1,406	128	128	60	9	4	850	1	436	10,861
LEDYARD	26	21	56	4	22	2,264	1,057	9	126	529	129	401	279	6	9	397	2	172	5,509
LISBON	49	38	22	10	193	138	33	152	75	80	7	779	75	6	77	10	5	52	1,801
MONTVILLE	120	148	315	15	45	1,373	159	24	1,067	945	20	1,032	229	109	26	75	2	594	6,298
NEW LONDON	15	26	272	3	9	3,514	118	5	201	4,959	30	163	34	14	5	171	-	1,109	10,648
NORTH STONINGTON	7	9	23	2	35	771	144	5	30	184	1,104	155	128	2	5	543	6	61	3,214
NORWICH	484	337	236	82	467	1,496	448	280	926	852	73	9,888	940	55	271	116	17	580	17,548
PRESTON	22	16	22	3	47	253	121	12	93	81	30	460	292	3	11	31	6	53	1,555
SALEM	31	158	58	3	5	149	10	3	116	97	2	92	11	107	3	9	-	66	920
SPRAGUE	32	26	18	53	84	114	24	56	55	66	5	512	48	4	475	9	3	41	1,625
STONINGTON	6	13	72	1	7	3,281	294	2	64	713	425	89	52	6	3	2,248	1	228	7,505
VOLUNTOWN	6	7	4	2	177	36	16	12	11	16	18	111	68	1	8	9	62	9	573
WATERFORD	27	45	540	4	15	2,776	99	8	324	2,861	25	290	59	26	9	142	1	1,540	8,797
TOTALS:	1,120	2,225	2,737	337	2,268	25,118	3,044	754	3,758	14,073	2,063	16,238	2,639	471	1,072	4,719	205	5,846	88,687

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 38

INTRA-REGIONAL PROJECTED TRUCK TRAVEL PATTERN - 1990

Trip Productions \ Trip Attractions	BOZRAH	COLCHESTER	EAST LYME	FRANKLIN	GRISWOLD	GROTON	LEDYARD	LISBON	MONTVILLE	NEW LONDON	NORTH STONINGTON	NORWICH	PRESTON	SALEM	SPRAGUE	STONINGTON	VOLUNTOWN	WATERFORD	TOTALS
BOZRAH	191	25	9	8	16	11	16	14	69	11	2	197	21	14	8	3	1	18	634
COLCHESTER	20	1,147	16	5	6	7	5	5	33	8	3	47	5	39	3	5	-	13	1,367
EAST LYME	8	20	1,071	2	6	108	24	4	182	162	7	48	13	26	3	27	-	380	2,091
FRANKLIN	7	5	1	145	3	2	2	3	7	2	1	26	3	1	17	1	-	3	229
GRISWOLD	15	8	6	4	893	8	15	86	25	7	14	155	48	2	26	5	113	11	1,441
GROTON	16	14	170	3	12	4,822	506	8	185	747	122	96	58	16	6	957	1	497	8,236
LEDYARD	15	6	23	3	15	377	1,622	8	78	83	77	123	145	3	5	205	2	62	2,852
LISBON	15	7	4	4	99	5	9	254	23	5	3	181	18	2	31	2	3	9	674
MONTVILLE	67	43	180	8	28	119	82	22	1,459	151	11	319	111	87	14	30	1	273	3,005
NEW LONDON	13	13	209	2	9	606	112	6	194	3,299	27	75	21	15	4	129	1	1,130	5,865
NORTH STONINGTON	1	2	3	1	11	44	41	2	5	9	981	17	24	1	1	120	3	7	1,273
NORWICH	235	76	61	37	205	84	163	209	394	73	32	4,534	312	23	105	27	12	128	6,710
PRESTON	22	8	14	3	53	45	161	18	116	18	36	265	483	3	10	19	10	30	1,314
SALEM	12	45	23	1	2	9	3	1	79	10	1	17	3	164	1	3	-	18	392
SPRAGUE	7	3	3	18	24	4	5	26	12	3	2	74	8	1	409	2	1	5	607
STONINGTON	2	4	18	1	3	648	157	1	20	67	162	14	12	2	2	1,530	1	49	2,693
VOLUNTOWN	1	1	-	-	118	1	3	3	2	1	4	10	10	-	1	1	91	1	248
WATERFORD	19	18	402	3	12	343	70	9	296	959	17	109	30	22	6	80	1	1,655	4,051
TOTALS:	666	1,445	2,213	248	1,515	7,243	2,996	679	3,179	5,615	1,502	6,307	1,325	421	652	3,146	241	4,289	43,682

Source: Developed from the Connecticut Department of Transportation's computerized data.

TABLE 39

INTRA-REGIONAL PROJECTED VEHICULAR TRAVEL PATTERN (ALL PURPOSE) - 1990

Trip Productions \ Trip Attractions	BOZRAH	COLCHESTER	EAST LYME	FRANKLIN	GRISWOLD	GROTON	LEDYARD	LISBON	MONTVILLE	NEW LONDON	NORTH STONINGTON	NORWICH	PRESTON	SALEM	SPRAGUE	STONINGTON	VOLUNTOWN	WATERFORD	TOTALS
BOZRAH	1,613	344	103	68	133	238	166	123	744	205	16	3,316	170	116	75	29	5	237	7,701
COLCHESTER	213	10,967	174	34	52	181	54	38	312	152	12	660	47	329	29	33	3	163	13,453
EAST LYME	91	260	11,562	14	53	2,319	247	35	2,155	3,324	52	716	106	242	29	279	3	5,505	26,992
FRANKLIN	102	72	22	1,007	33	65	30	29	87	47	5	504	30	12	206	10	2	44	2,307
GRISWOLD	242	157	108	43	8,397	333	213	1,203	382	236	139	3,576	596	27	343	70	839	219	17,123
GROTON	84	104	1,099	16	60	32,852	3,579	36	1,005	6,955	657	712	255	68	32	7,133	6	3,623	58,276
LEDYARD	204	107	343	26	139	7,305	17,737	81	1,038	1,863	721	2,325	1,358	33	57	2,937	19	997	37,290
LISBON	233	112	69	38	1,223	194	113	2,185	309	150	23	3,798	188	18	386	28	26	153	9,246
MONTVILLE	958	633	2,576	72	243	2,639	959	199	14,779	3,213	80	5,977	956	908	135	319	10	4,457	39,113
NEW LONDON	93	116	1,901	15	58	8,078	782	38	1,430	28,954	135	713	115	83	32	885	4	9,358	52,790
NORTH STONINGTON	28	31	77	6	143	1,514	670	26	110	369	8,759	500	346	8	19	2,603	32	182	15,423
NORWICH	2,542	950	727	299	1,882	2,090	1,613	1,947	4,144	1,522	226	51,599	2,525	179	1,038	297	76	1,654	75,310
PRESTON	179	69	118	19	347	532	1,197	120	939	226	195	3,269	2,131	18	63	140	55	279	9,896
SALEM	154	701	301	11	19	229	34	13	893	214	7	275	26	1,069	10	28	1	255	4,240
SPRAGUE	125	70	54	251	333	159	78	389	196	119	17	1,850	106	12	4,363	25	11	111	8,269
STONINGTON	28	51	313	7	32	10,541	2,087	15	282	1,850	1,788	297	124	22	14	18,123	5	921	36,500
VOLUNTOWN	19	18	14	5	1,177	54	50	61	34	29	53	326	166	3	25	23	706	25	2,788
WATERFORD	199	220	5,821	26	99	6,713	689	71	3,399	16,148	116	1,564	227	176	54	773	5	18,466	54,766
TOTALS:	7,107	14,982	25,382	1,957	14,423	76,036	30,298	6,609	32,238	65,576	13,001	81,977	9,472	3,323	6,910	33,735	1,808	46,649	471,483

Source: Developed from the Connecticut Department of Transportation's computerized data.

Total auto trips in the region are expected to increase by 47% by 1990, as shown in Table 42. Auto person trips are expected to increase by 54.5% during the same period. The highest trip increase will be in auto trips for shopping. The highest increase in person travel will be 61% for work. Table 40 indicates the assumed car occupancy factors for 1990.

Figures 24 and 25 show the projected trip productions for 1990 in each of the region's towns. Figures 26 and 27 show the projected trip attractions for 1990.

2. Travel Desires - 1990

Continued growth and development of the region is expected to result in increased trip movements in spite of the expansion of mass transit facilities and car pooling.

Intraregional Travel Desire. 1990 travel desire lines for work purposes between the various towns are shown on Figure 28. Figure 29 indicates travel desire lines for all purposes of vehicular traffic.

Interregional Travel Desire. Analysis of travel desire lines for interregional traffic could not be made a part of this report. However, movements of trips from Westerly, Rhode Island and from the Northeastern Connecticut Region to the Groton, New London and Norwich employment areas can well be discerned on weekdays, and recreational traffic from the Hartford-Springfield areas to Rhode Island beaches on summer weekends has substantial impacts on the regional traffic arteries.

3. Average Trip Length - 1990

Average trip lengths for the region's travel for 1990 are shown in Table 41. The average trip length is expected to increase in 1990 for all trip purposes.

TABLE 40

ASSUMPTIONS* OF CAR OCCUPANCY FACTORS FOR 1990

Purpose	Car Occupancy Factor
Work	1.46
Pers., Bus., Med. & Dent.	1.98
Education	1.65
Social, Civic, Religious	2.1
Recreation	2.6
Shopping	1.98
Others	1.99
Average	1.87

* Educated guess.

4. Intraregional Auto Person Travel

Table 42 indicates auto-person travel for intraregional travel in 1990. The comparison shows that the increase of person travel in 1990 over 1970 will be 54.5%. The maximum increase is expected in work travel, which will be about 61% over 1970.

G. GOODS MOVEMENT

The efficient movement of goods in an urban area is essential for a healthy economy. The consideration

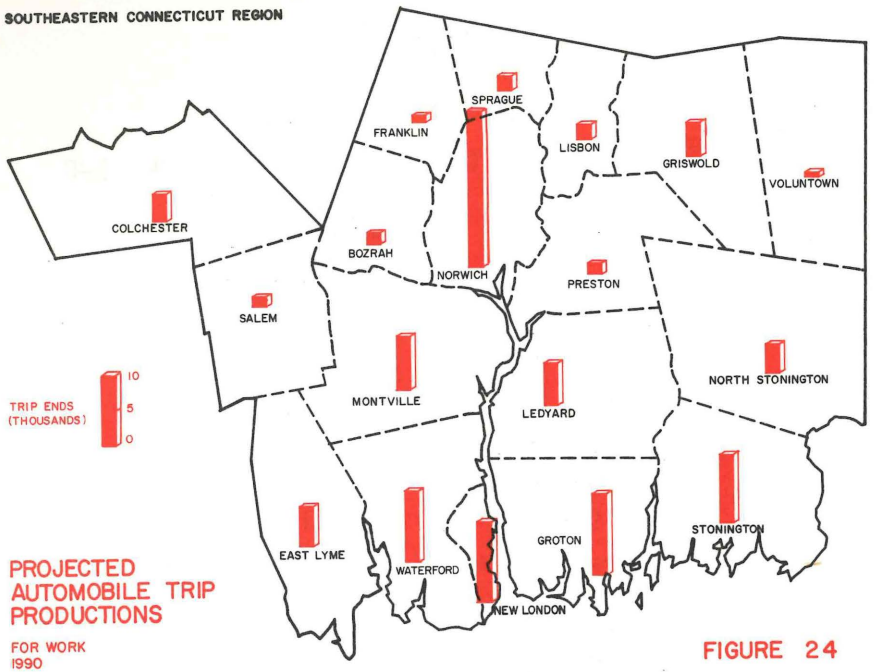


FIGURE 24

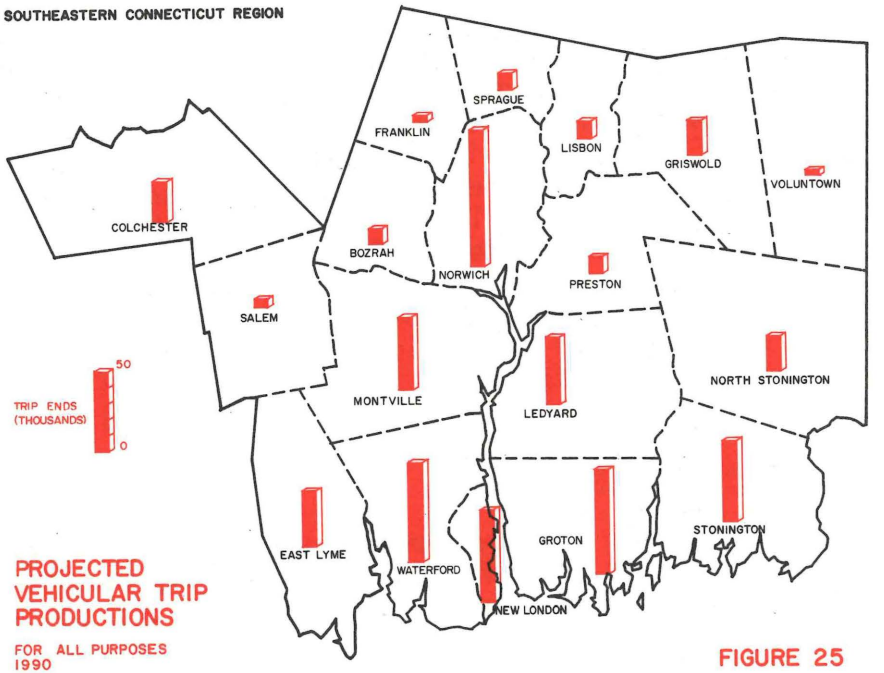


FIGURE 25

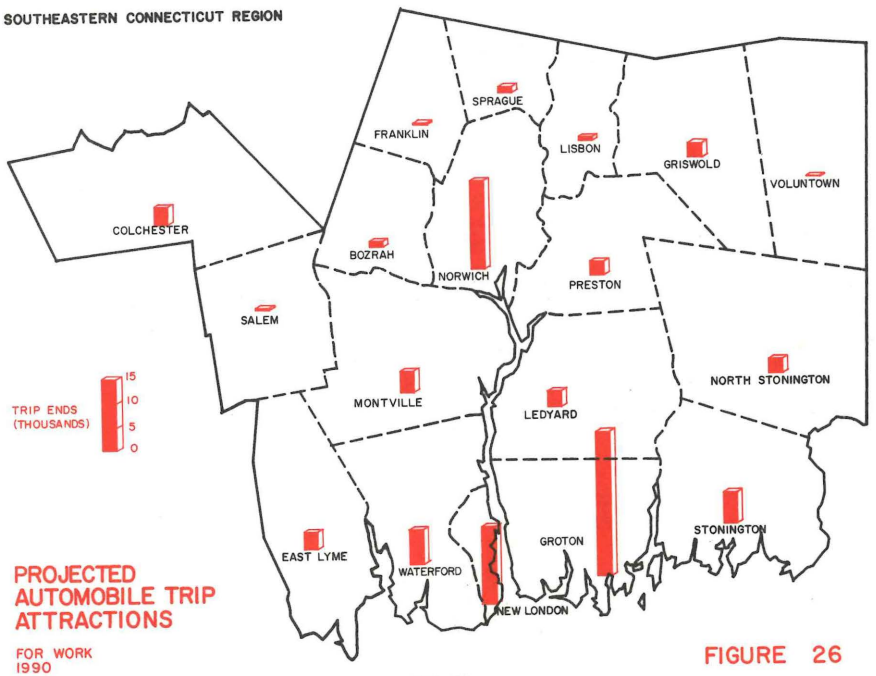


FIGURE 26

SCRPA 1975

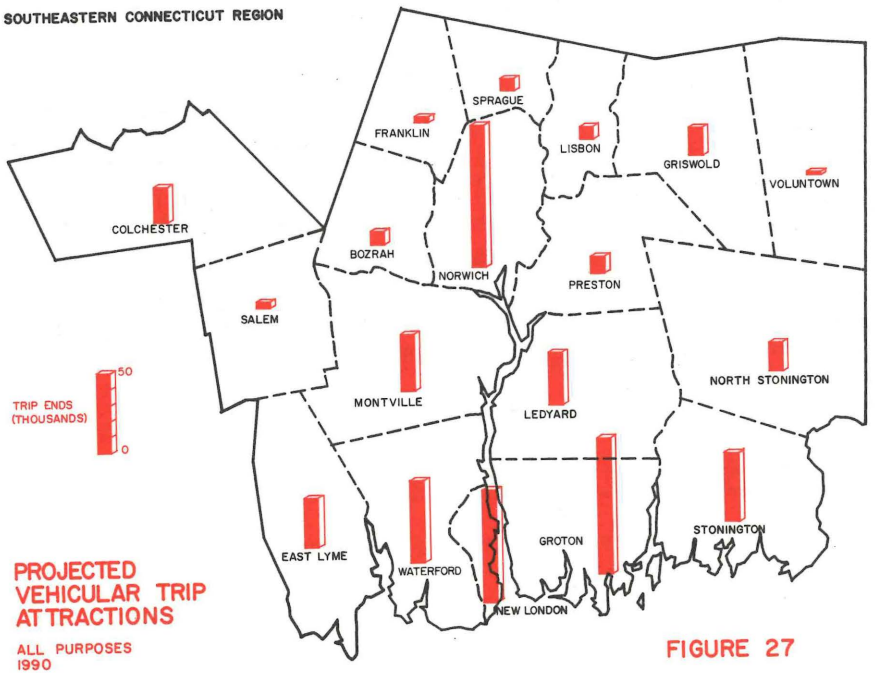


FIGURE 27

TABLE 41

AVERAGE TRIP LENGTHS - STATEWIDE, 1990

Purpose #	Trip Productions	ATL Minutes	ATL Miles
Work (1)	1,581,138	15.94	9.02
Long (2)	959,354	19.31	11.21
Short(3)	2,724,483	9.35	5.07
NHB (4)	2,214,688	12.43	6.93
Truck(5)	779,633	15.49	8.94
TOTAL:	8,259,296	13.17	7.40

Source: CONNDOT
Bureau of Planning and Research
May, 1975

TABLE 42

INTRA - REGIONAL TRAVEL (AUTO AND AUTO-PERSON)

1970 AND 1990

	Auto Trip			Auto-Person		
	1970	1990	% Increase	1970	1990	% Increase
Work	200,784	270,896	35	244,956	395,508	61
Pers., Bus., Med. & Dent.	101,088	155,624	54	200,154	308,135	54
Education	11,501	16,267	41	18,977	26,840	41
Social, Civic, Religious	70,975	102,812	45	149,048	215,905	45
Recreation	25,990	36,948	42	64,975	96,065	48
Shopping	130,102	202,742	56	258,903	403,456	56
Other	138,114	214,741	56	274,847	427,335	55
TOTAL:	678,554	1,000,030	47	1,211,860	1,873,244	54.5

Source: Developed from computerized data supplied by CONNDOT.

of trucks, railroads, and their relation to the movement of goods by these modes, are extremely important in planning and designing not only future highway facilities, but also industrial parks, warehouses, and trucking terminals, and many other facilities that are dependent upon the movement of goods for their survival.

1. Goods Movement Facilities

Southeastern Connecticut is served by various modes of transportation for the movement of goods. Rail lines extend north-south and east-west. However, little information is available on trucking terminals and the volumes of commodities moved within the region and to and from points beyond the region's boundaries. More data should be gathered in the future on this subject.

2. Previous Studies and Surveys

The Connecticut Interregional Planning Program (CIPP) conducted an internal and external truck and goods movement survey in the early 1960s throughout the state. CIPP also conducted studies on goods movement at the state line. No breakdown of data was made available at the regional level to evaluate the movement of the type of goods moved by truck for this region. Goods movement by other modes of transportation will be discussed later in this report.

3. Intraregional Truck Trips and Travel Desires for 1970

Truck trips are an important segment of the total vehicular travel within the region. Truck trips constituted 10.9% of the vehicular trips in 1970. Table 19 indicates the truck travel pattern from one town to the other in the region for 1970. Figure 30 indicates the truck trip end productions for 1970

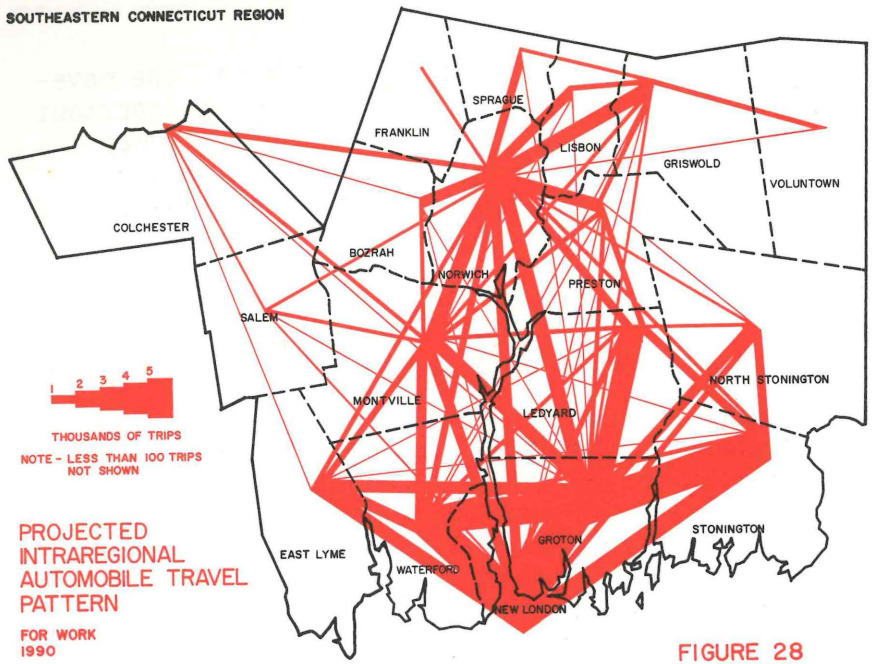


FIGURE 28

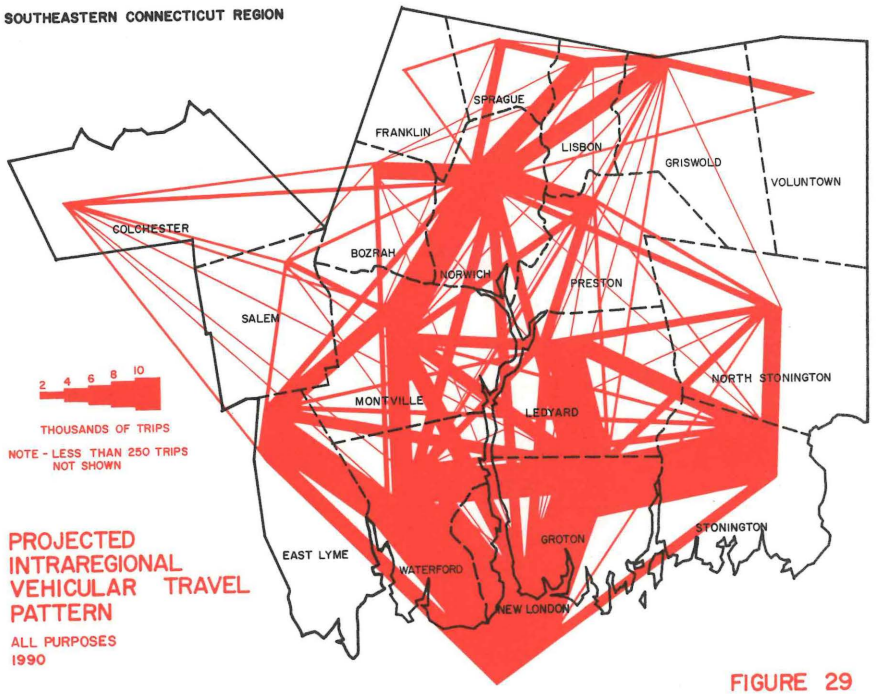


FIGURE 29

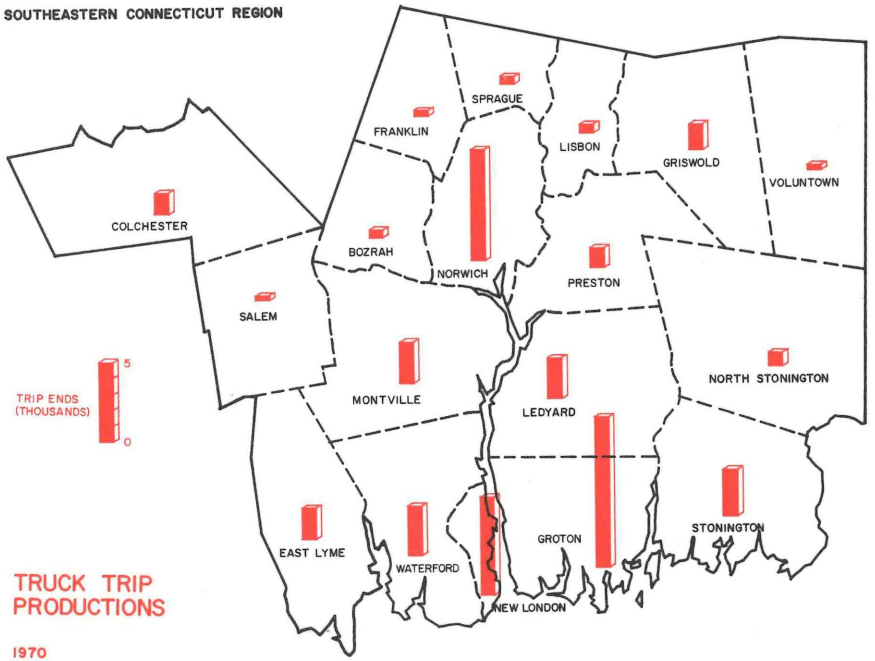


FIGURE 30

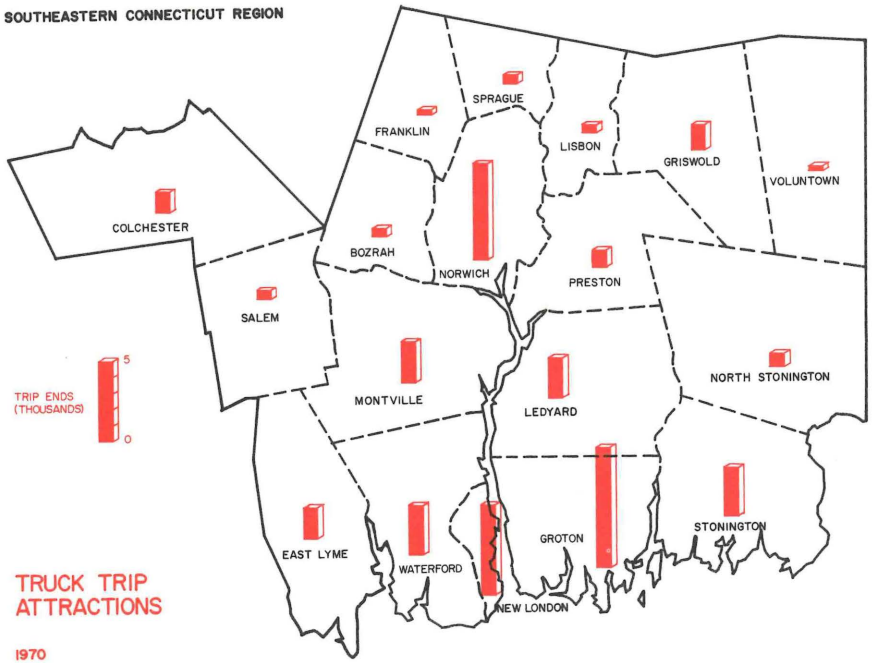


FIGURE 31

and Figure 31 indicates the truck trip end attractions for 1970 for each of the towns of the region. Figure 32 depicts the truck travel desire lines in the region for the same year. This illustration shows that most of the truck travel was concentrated in the southern part of the region.

4. Future Intraregional Truck Movements for 1990

Figure 33 indicates the truck trip end production for each town in the region estimated for 1990. Figure 34 indicates the projected 1990 truck trip attractions by town. Projected trips reflect the increase in economic activity in various parts of the region by 1990. The desire lines for 1990 trips for truck movements in the region are shown in Figure 35. It follows the same pattern of movement as in 1970. The total estimated forecast of truck trip productions in the region for 1990 are expected to be 109,119 as shown in Table 35. The increase of truck trip movement in 1990 over 1970 is expected to be 31.6% as shown in Table 43.

5. Pipeline Facilities

Pipeline transportation of oil products is much more expensive than shipment by tanker. Oil companies are becoming increasingly concerned, however, with the rising costs of tanker operations and the disruptions of supplies caused by maritime strikes. Pipelines do provide an advantage in serving inland consuming areas without transhipping products, and they avoid congestion. There is only one gas pipeline in this region as shown in Figure 36. No information is available about any future pipelines in this region for carrying petroleum products. However, the possibility of a future pipeline from Groton-New London to Norwich does exist.

TABLE 43

PERCENTAGE INCREASE OF VEHICULAR TRIPS, 1970-1990

Purpose	1970 Total Trips	1990 Total Trips	% Increase
Purpose I, Work Trips	164,362	215,104	30.9
Purpose II, Long Trips	83,447	116,179	39
Purpose III, Short Trips	248,490	389,787	56.9
Purpose IV, Non-Home Based Trips	182,111	278,960	53.2
Purpose V, Trucks	82,913	109,119	31.6
TOTALS:	761,323	1,109,149	45.69

Source: Developed from computerized data supplied by CONNDOT.

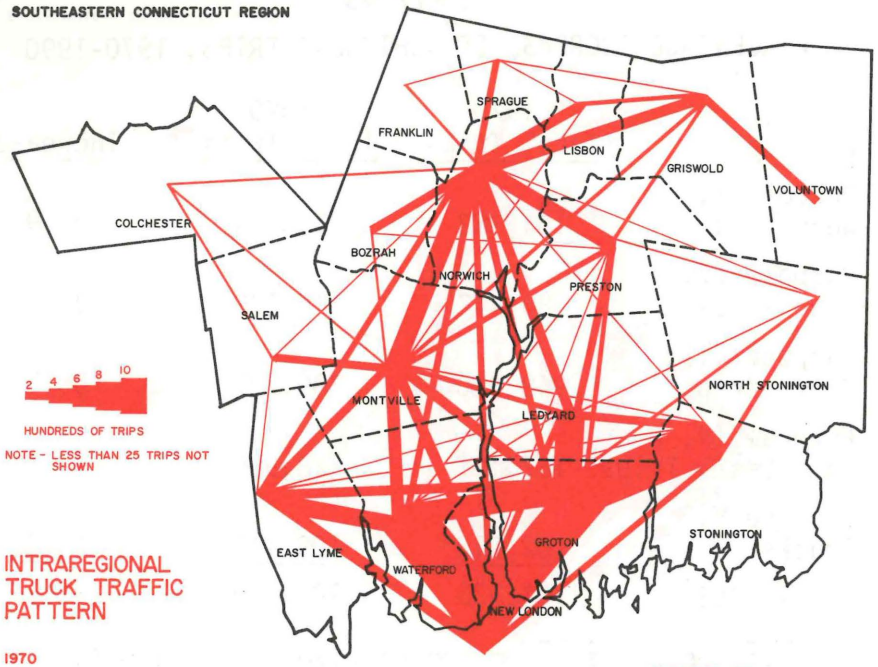
H. FEDERAL-AID URBAN SYSTEM

Public Law 91-605, the Federal-Aid Highway Act of 1970, initiated the Urban Systems Program and provided for the utilization of federal funds for eligible roadway projects located on the urban systems route network in the then-designated U.S. Bureau of Census urbanized area. Section 109 of the Federal-Aid Highway Act of 1973 (Public Law 93-87) broadens the utilization of federal-aid urban system funds to be used in expanded urban areas.

1. Urban Area Boundaries

The federal-aid urban boundaries in the Southeastern Connecticut Region are shown on Figure 44.

SOUTHEASTERN CONNECTICUT REGION

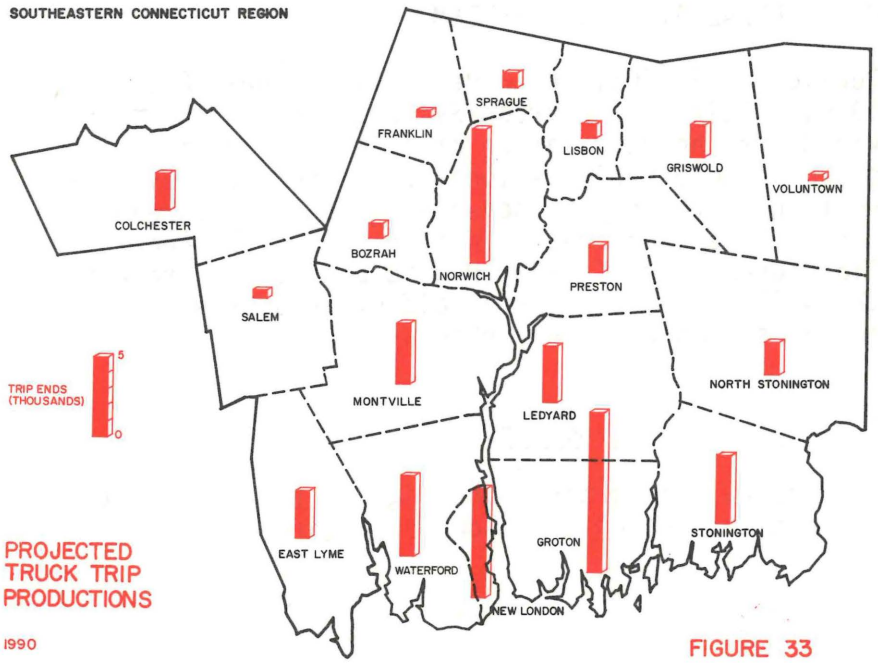


INTRAREGIONAL TRUCK TRAFFIC PATTERN

1970

FIGURE 32

SOUTHEASTERN CONNECTICUT REGION



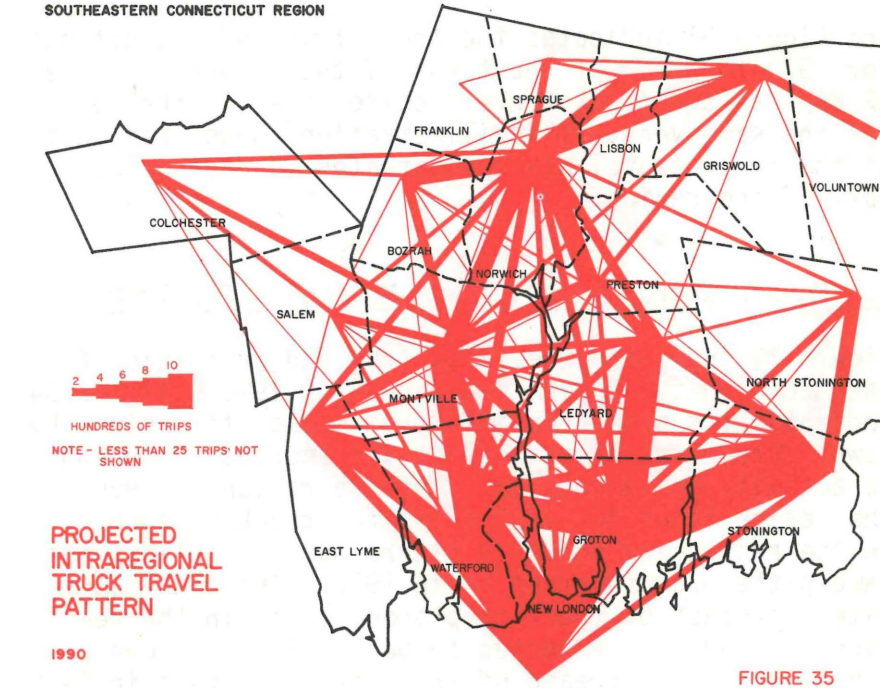
PROJECTED TRUCK TRIP PRODUCTIONS

1990

FIGURE 33

SCRPA 1975

SOUTHEASTERN CONNECTICUT REGION

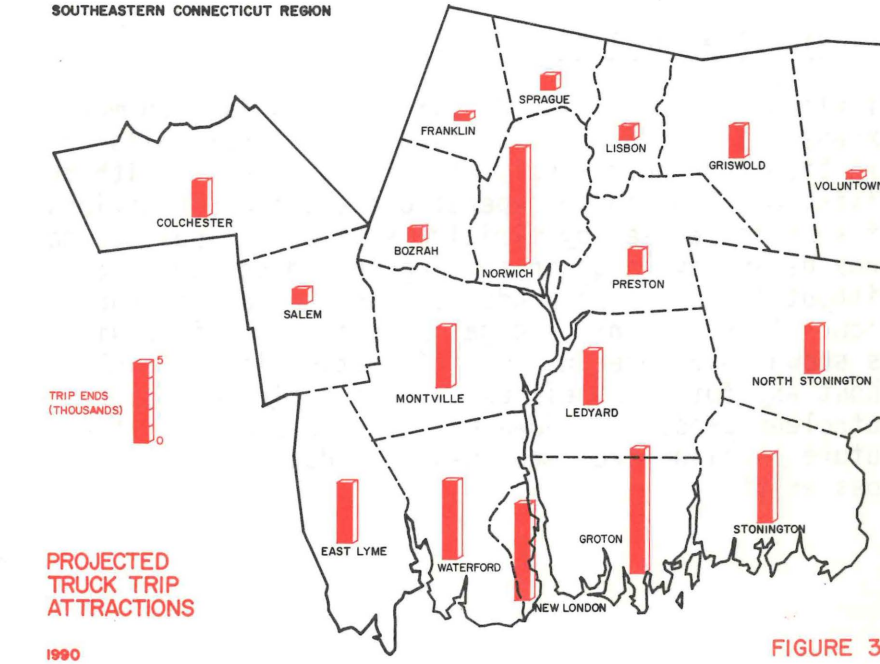


PROJECTED INTRAREGIONAL TRUCK TRAVEL PATTERN

1990

FIGURE 35

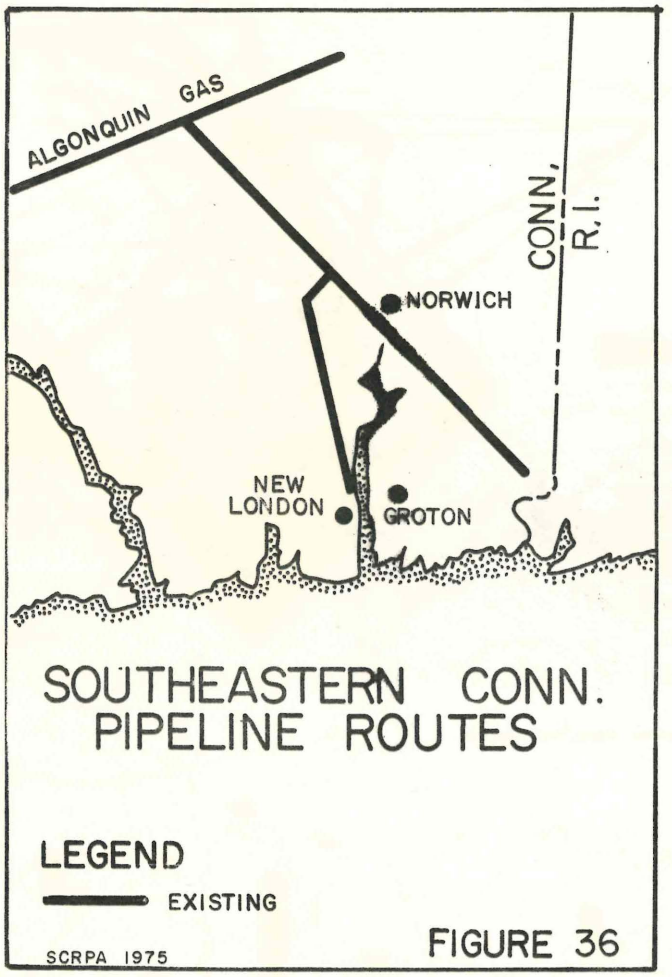
SOUTHEASTERN CONNECTICUT REGION



PROJECTED TRUCK TRIP ATTRACTIONS

1990

FIGURE 34



2. Urban System Route Network

Local officials of the municipalities included within the urbanized area, with the help of SCRPA, have designated the urban systems route network, which has been concurred with by the CONNDOT. (Figures 37-43.) The urban systems route network is awaiting approval by the Federal Highway Administration. The urban system route network in the urbanized area of the region consists of selected high traffic volume arterial and collector routes, including access roads to major traffic generators, such as airports, and other transportation terminals. It also includes portions of the street grid in the downtown area and a limited street grid in other areas having particularly heavy concentrations of traffic. The Federal-Aid Secondary Route System has been discontinued in the urbanized area and has been included into the proposed urban systems route network.

I. FUNCTIONAL CLASSIFICATION AND REALIGNMENT OF FEDERAL-AID PRIMARY AND SECONDARY SYSTEMS

Public Law 93-87, the Federal-Aid Highway Act of 1973, includes under Section 148 the requirement that the Federal-Aid Primary and Secondary Route Systems be functionally realigned as of July 1, 1976.

A cooperative effort by the chief elected officials of the region's municipalities, SCRPA, and CONNDOT designated the federal-aid system through the functional classification of the entire highway system of this region.

1. Classification

Functional classification is the process by which streets and highways are grouped into classes or systems according to the character of service they are intended to provide. Since the more densely populated cities generate and attract a large proportion of the relatively longer trips, the arterial highways generally provide direct service for such travel. The intermediate functional category, the collectors, serves small towns or parts of urban areas, directly connecting them to the arterial network, and also collects traffic from the system of local roads and streets. This hierarchy of the region's highway system is shown in Figure 44.

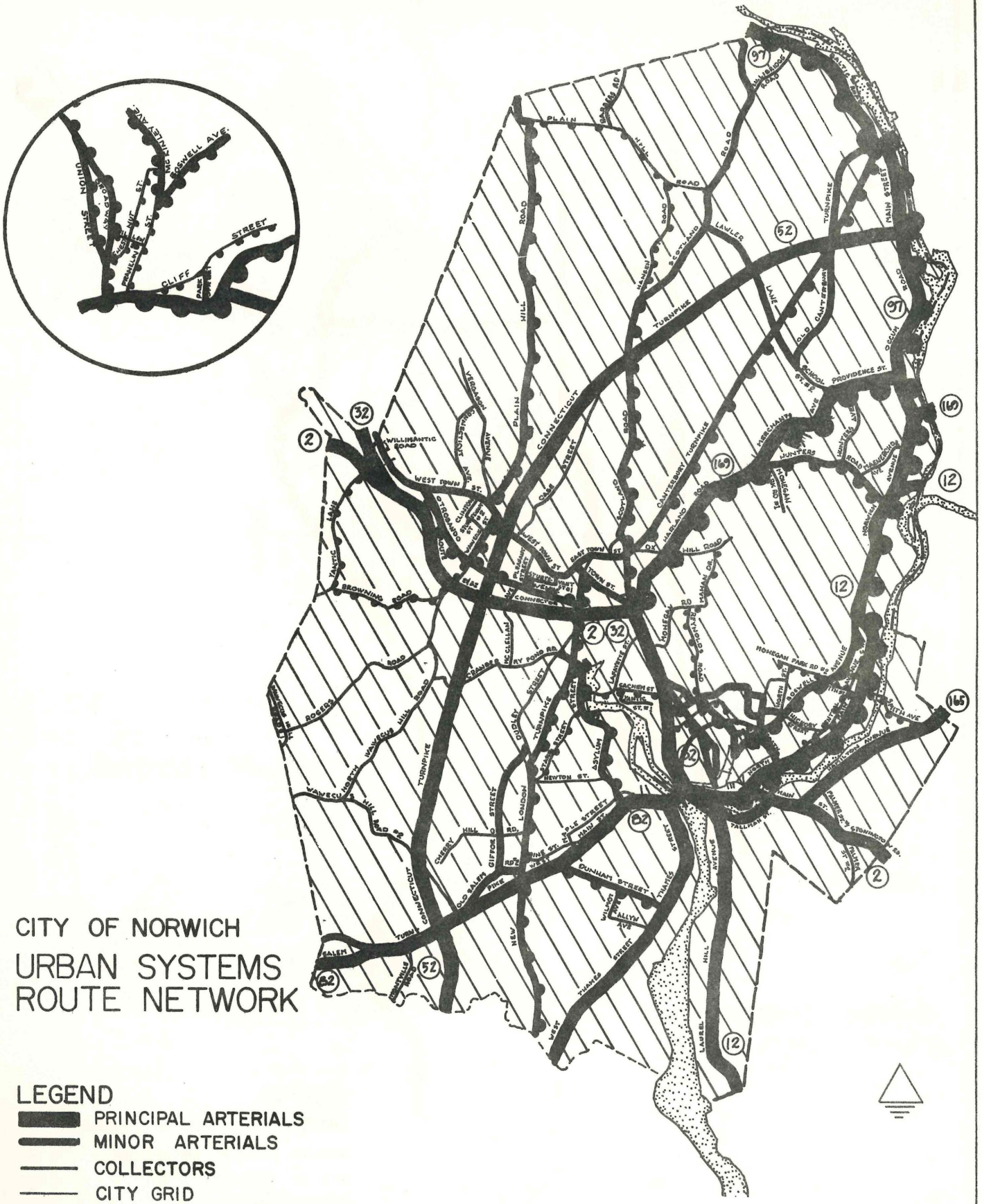

CITY OF NORWICH
URBAN SYSTEMS
ROUTE NETWORK
LEGEND
PRINCIPAL ARTERIALS
MINOR ARTERIALS
COLLECTORS
CITY GRID
URBAN BOUNDARIES
URBAN AREAS
FEDERAL AID URBAN SYSTEMS
SCRPA 1975

FIGURE 37

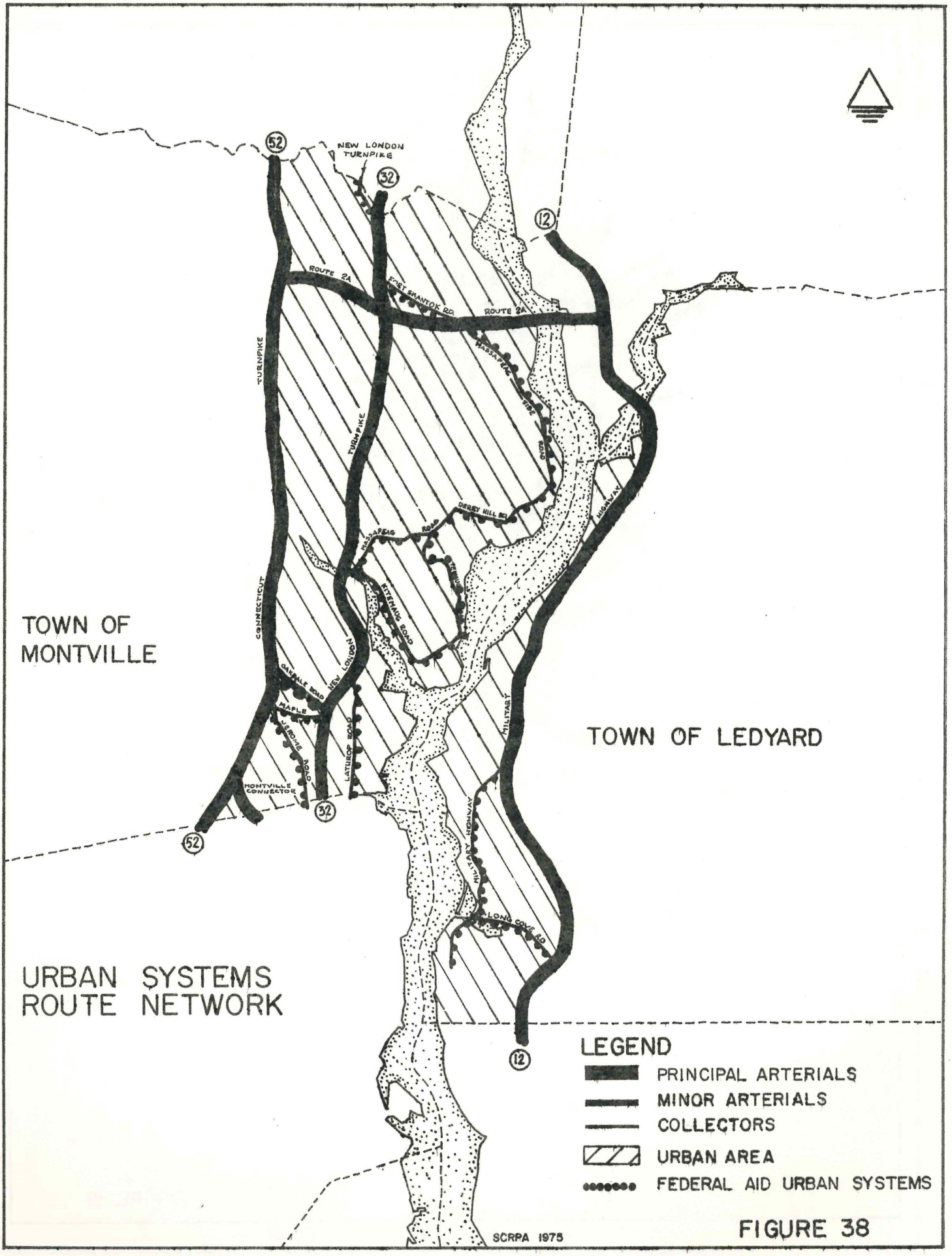
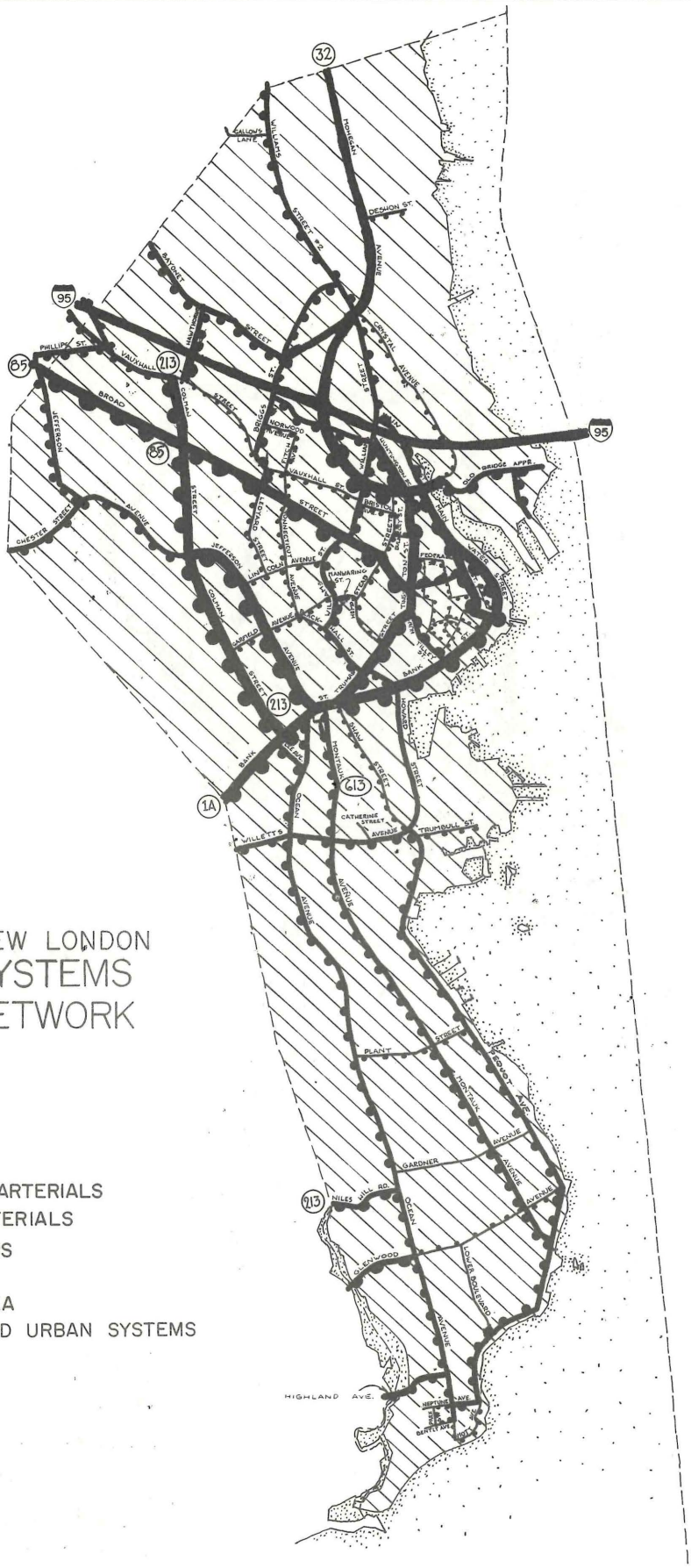

TOWN OF MONTVILLE
TOWN OF LEDYARD
URBAN SYSTEMS ROUTE NETWORK
NEW LONDON TURNPIKE
ROUTE 2A
FORT SHANTOK RD.
TURNPIKE
CONNECTICUT
GRISWOLD
MASHAPEAG ROAD
DERBY HILL RD.
HIGHWAY
KITEMAUG ROAD
MILITARY
OAKDALE ROAD
NEW LONDON
MAPLE
JEROME ROAD
LATHROP ROAD
MONTVILLE CONNECTOR
LONG COVE RD.
52
32
12
LEGEND
PRINCIPAL ARTERIALS
MINOR ARTERIALS
COLLECTORS
URBAN AREA
FEDERAL AID URBAN SYSTEMS
SCRPA 1975

FIGURE 38



CITY OF NEW LONDON
URBAN SYSTEMS
ROUTE NETWORK

LEGEND

- PRINCIPAL ARTERIALS
- MINOR ARTERIALS
- COLLECTORS
- CITY GRID
- URBAN AREA
- FEDERAL AID URBAN SYSTEMS

SCRPA 1975

FIGURE 39

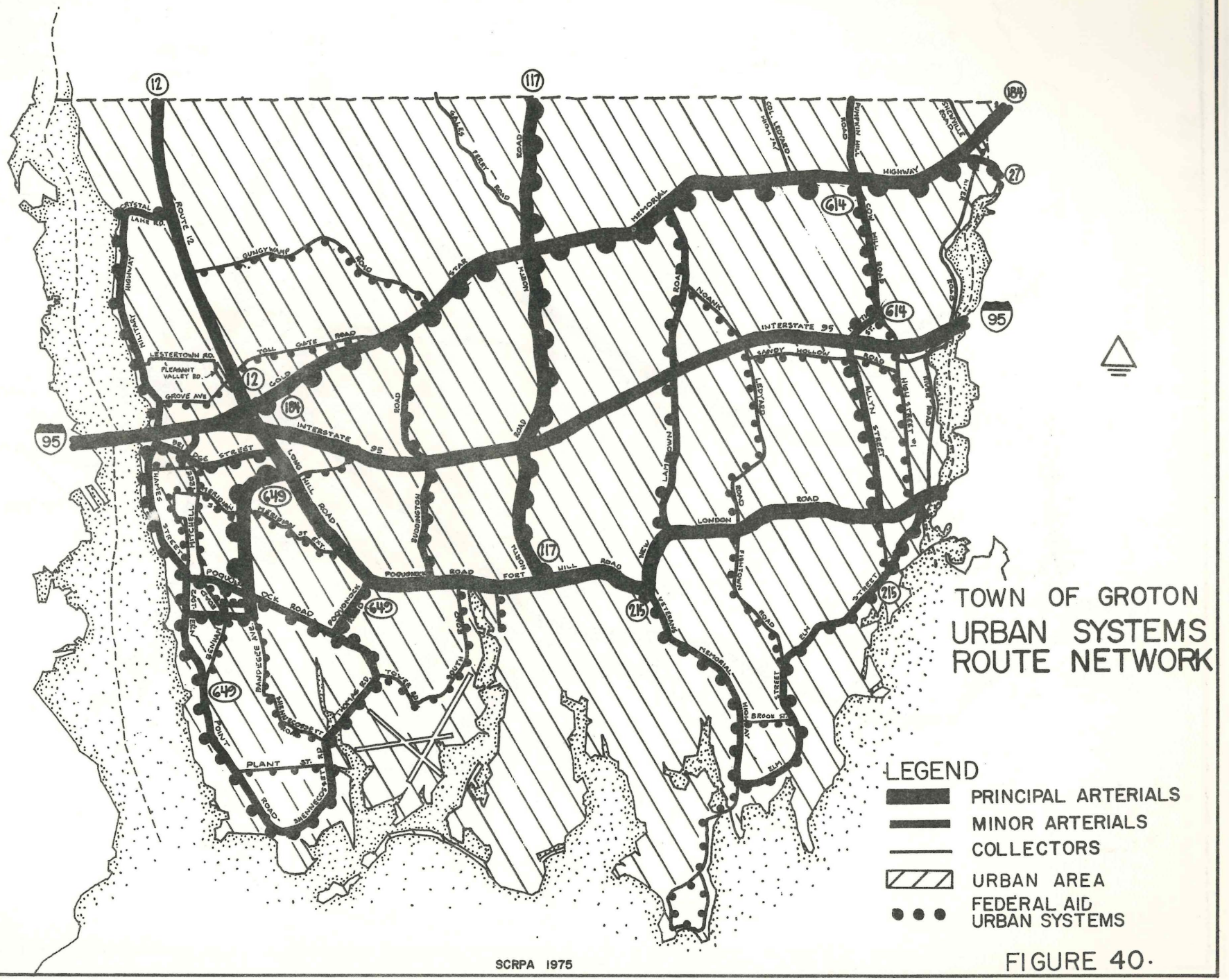

TOWN OF GROTON
URBAN SYSTEMS
ROUTE NETWORK
LEGEND
PRINCIPAL ARTERIALS
MINOR ARTERIALS
COLLECTORS
URBAN AREA
FEDERAL AID
URBAN SYSTEMS
SCRPA 1975

FIGURE 40.

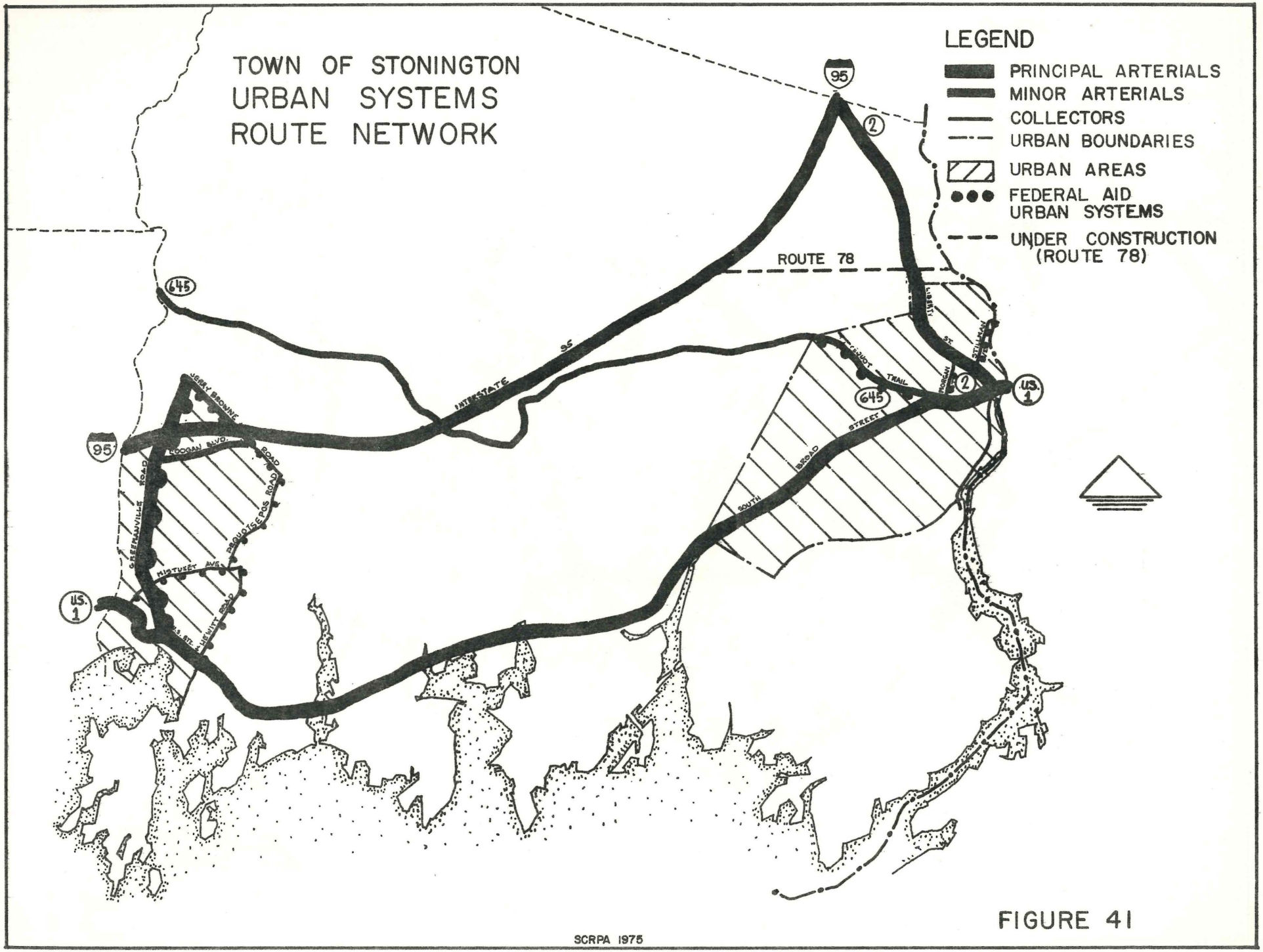


FIGURE 41

SCRPA 1975

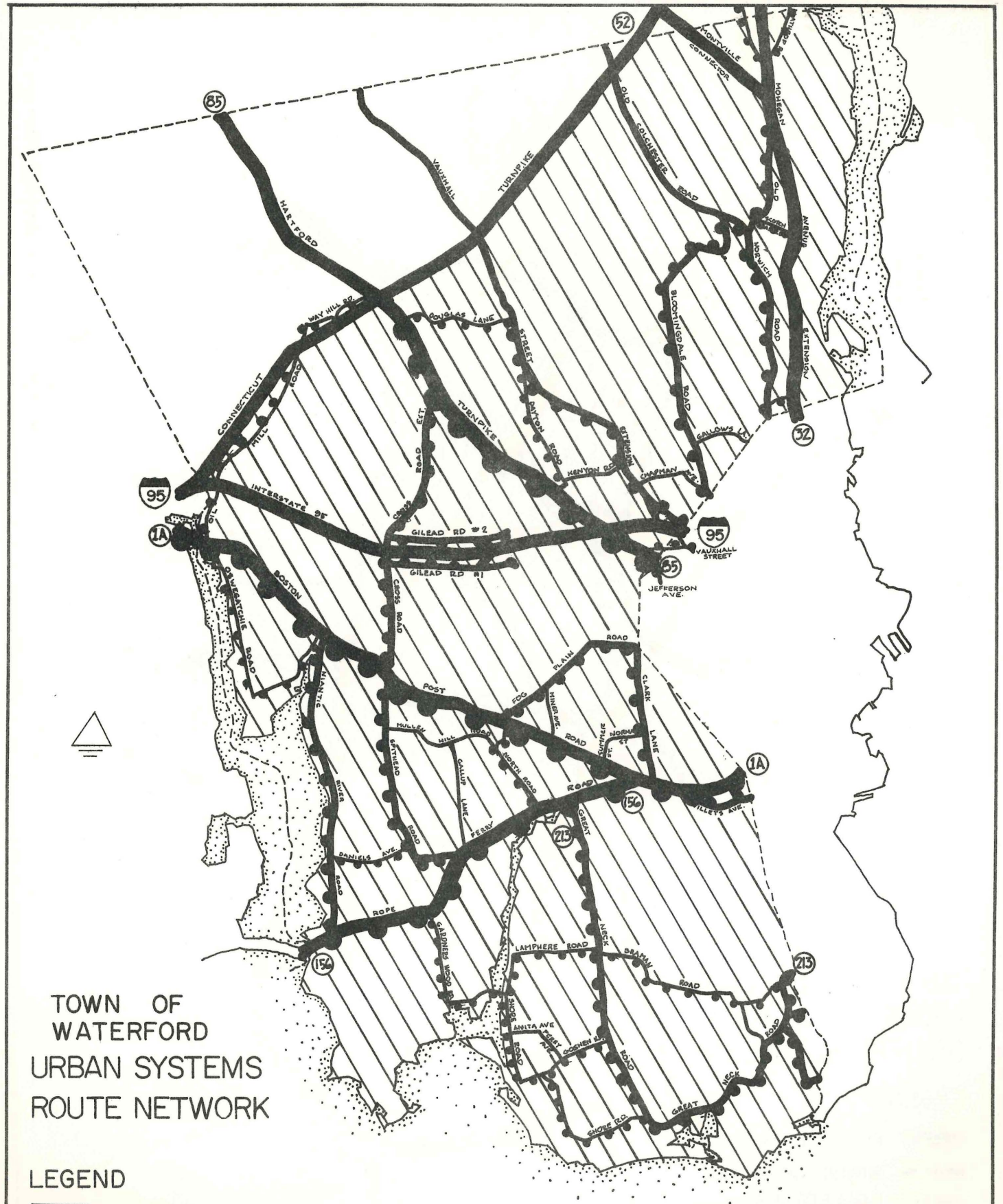
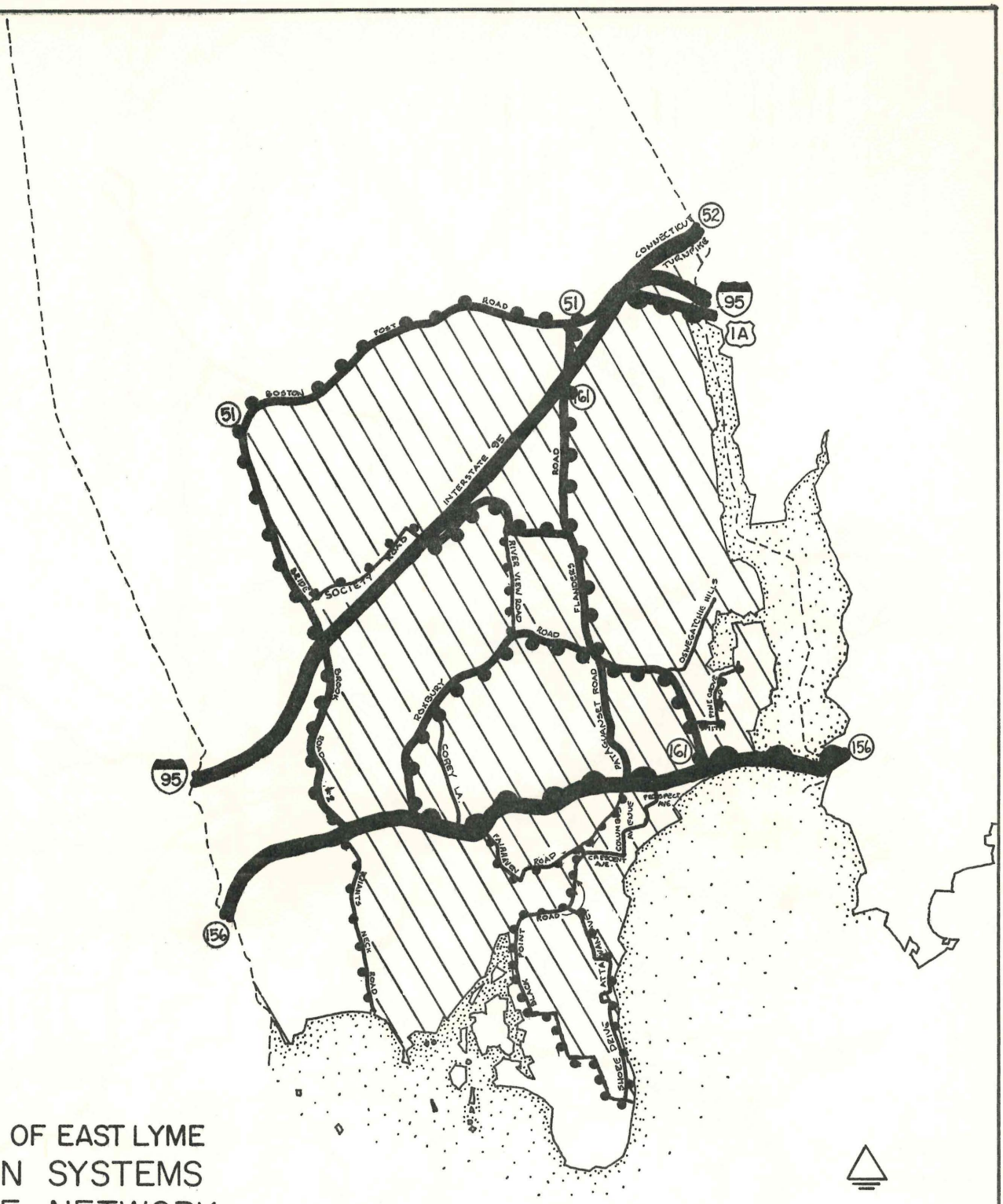

TOWN OF
WATERFORD
URBAN SYSTEMS
ROUTE NETWORK
LEGEND
PRINCIPAL ARTERIALS
MINOR ARTERIALS
COLLECTORS
URBAN AREA
FEDERAL AID URBAN SYSTEMS
SCRPA 1975

FIGURE 42



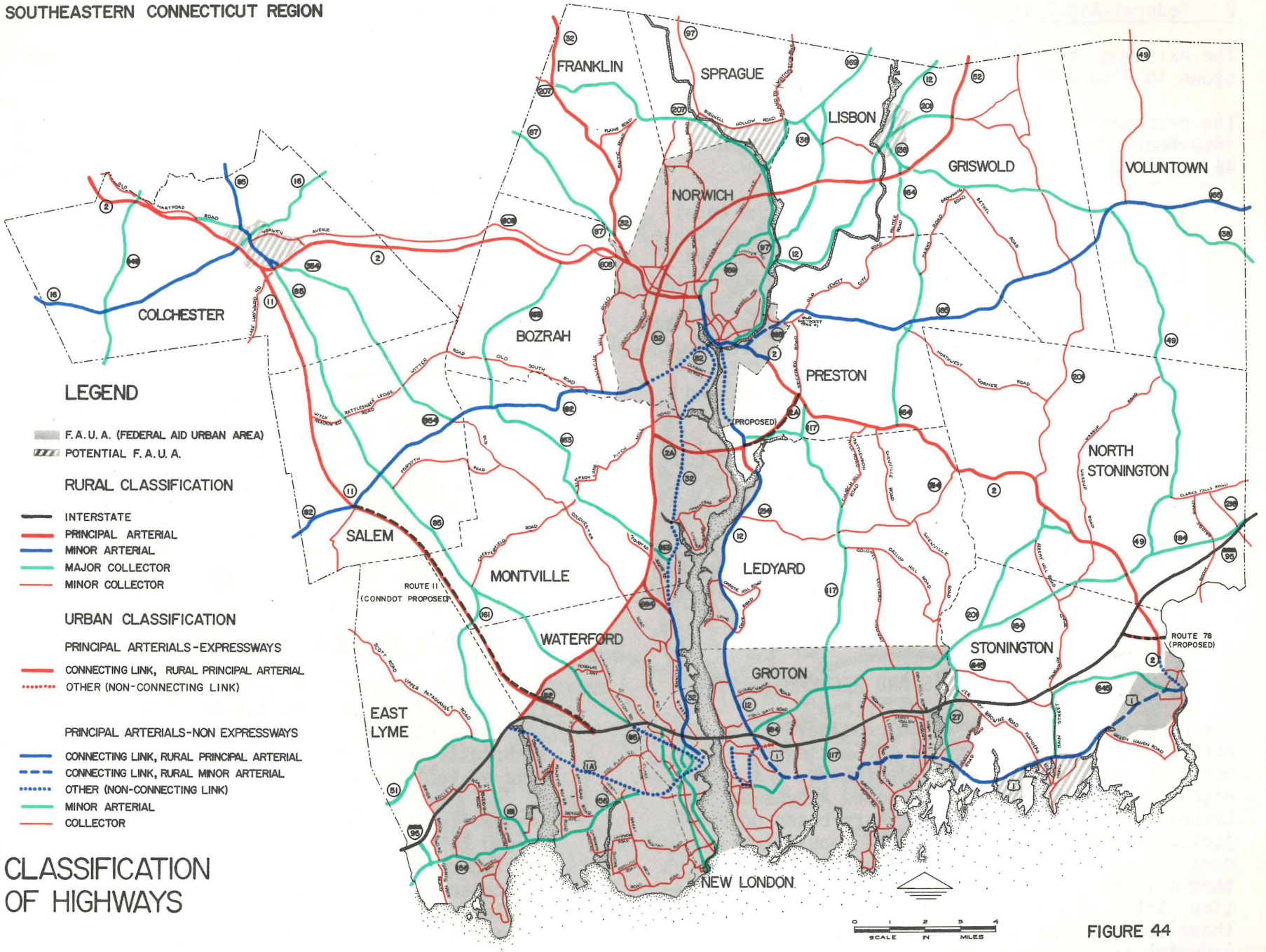
TOWN OF EAST LYME
URBAN SYSTEMS
ROUTE NETWORK

LEGEND

- PRINCIPAL ARTERIALS
- MINOR ARTERIALS
- COLLECTORS
- URBAN AREAS
- FEDERAL AID URBAN SYSTEMS

FIGURE 43

SCRPA 1975



CLASSIFICATION OF HIGHWAYS

FIGURE 44

EFFECTIVE JULY 1, 1976

SCRPA 1975

2. Federal-Aid Systems

The existing Federal-Aid System for this region is shown in Figure 45.

The proposed Federal-Aid System has been classified into four principal categories and is shown in Figure 46. The four categories are discussed below.

a. The Interstate System is part of the total interstate highway system of national importance for major interstate travel. This system is functionally classified as the interstate system.

b. The Federal-Aid Primary (FAP) System consists of main roads important to interstate, statewide, and regional travel and is comprised of functionally-classified rural arterial routes and their urban extensions.

c. The Federal-Aid Secondary (FAS) System consists of rural major collector routes. The FAS system is designated in rural areas only.

d. The Federal Aid Urban System consists of the designated urban system route network within the urbanized area of the region, as discussed previously.

J. HIGHWAY SYSTEMS ANALYSIS AND RECOMMENDATIONS

The purpose of this plan is to provide for the transportation of people and goods in Southeastern Connecticut within the foreseeable future. As far as highways are concerned, these needs represent the travel desires of the next 15 years based on projected growth and distribution of population, employment and car ownership. It is these travel desires that must be provided for in any future transportation system, for it is the traffic volumes born of these desires that will create the capacity deficiencies on the existing highway system.

1. System Deficiencies

For the development of a future plan, it is not sufficient to say that the existing highway system, as we know it today, will be inadequate to cope with the transportation needs of the 1990s. This may be true, but it is also true that many of the existing facilities will become inadequate long before the next decade, as shown on Figure 47. To plan for the future, it is necessary to know when, where, and to what extent these deficiencies will develop.

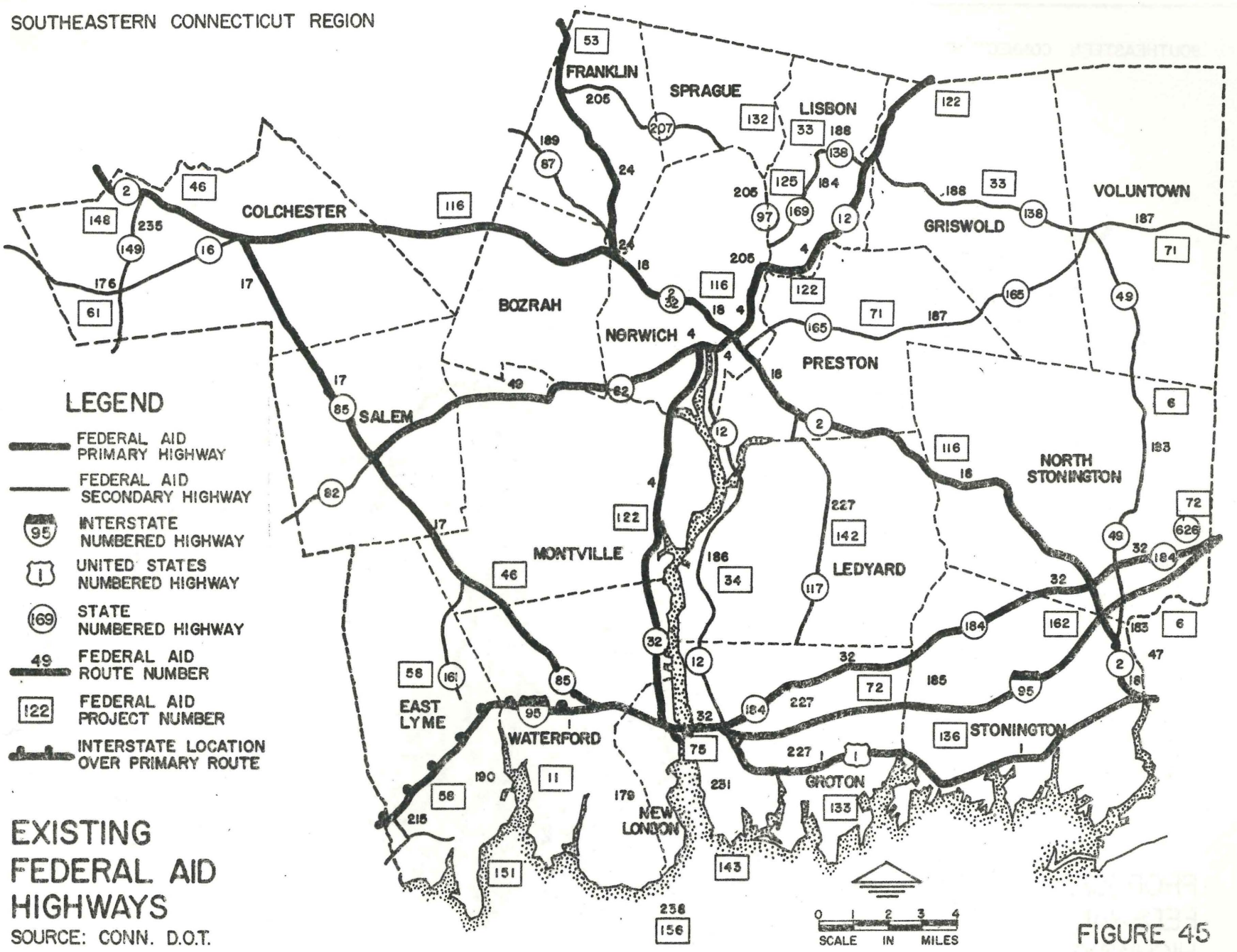
2. Location of Increased Traffic Demand

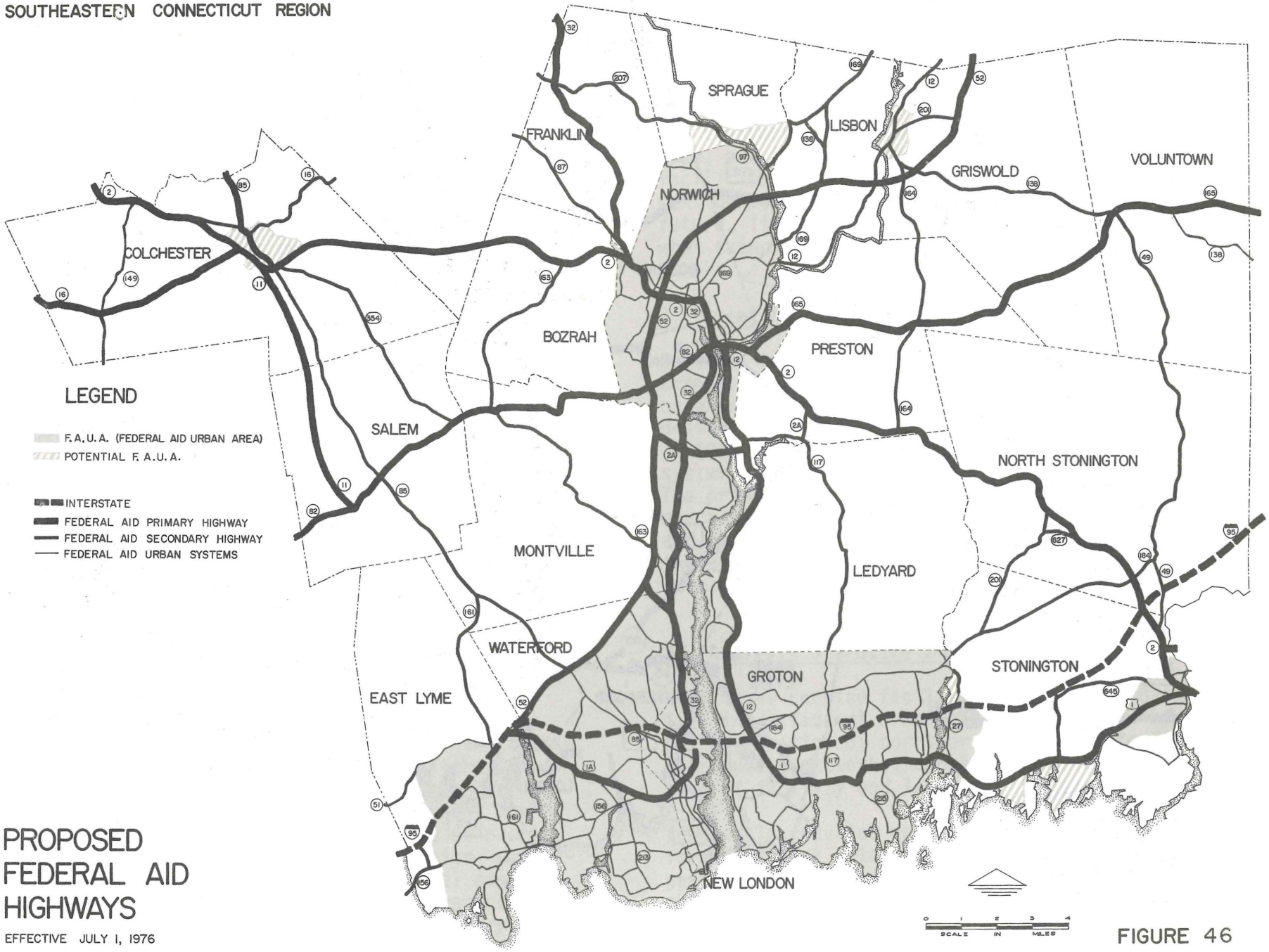
Regional population and employment projections, changes in development patterns, and traffic volumes on existing facilities are reflected in the travel desires of the future. The increased traffic volumes of 1990 are not uniformly distributed throughout the system, but are concentrated in specific corridors. The principal corridors of heavy regional travel are north/south along both sides of the Thames River, and east/west along the coast. This is essentially the area of greatest existing and potential future development in the region as well.

3. Analysis of Future Improvement Needs

Additional service facilities needed to provide relief in deficient areas can be determined by careful examination of corridor assignments to future alternative networks, considering such factors as type of facility and land use.

In heavily traveled corridors, many drivers will be forced to seek alternative routes when traffic congestion reaches major proportions. In some cases, the capacity of all the major facilities in a particular corridor may be approached or exceeded, requiring a new facility or extensive improvement of existing facilities.


SOUTHEASTERN CONNECTICUT REGION
FRANKLIN
SPRAGUE
LISBON
COLCHESTER
BOZRAH
NORWICH
PRESTON
GRISWOLD
VOLUNTOWN
SALEM
MONTVILLE
LEDYARD
NORTH STONINGTON
EAST LYME
WATERFORD
NEW LONDON
GROTON
STONINGTON
LEGEND
FEDERAL AID PRIMARY HIGHWAY
FEDERAL AID SECONDARY HIGHWAY
INTERSTATE NUMBERED HIGHWAY
UNITED STATES NUMBERED HIGHWAY
STATE NUMBERED HIGHWAY
FEDERAL AID ROUTE NUMBER
FEDERAL AID PROJECT NUMBER
INTERSTATE LOCATION OVER PRIMARY ROUTE
EXISTING FEDERAL AID HIGHWAYS
SOURCE: CONN. D.O.T.
0 1 2 3 4
SCALE IN MILES
FIGURE 45
SCRPA 1975



PROPOSED FEDERAL AID HIGHWAYS

EFFECTIVE JULY 1, 1976

FIGURE 46

SCRPA 1975

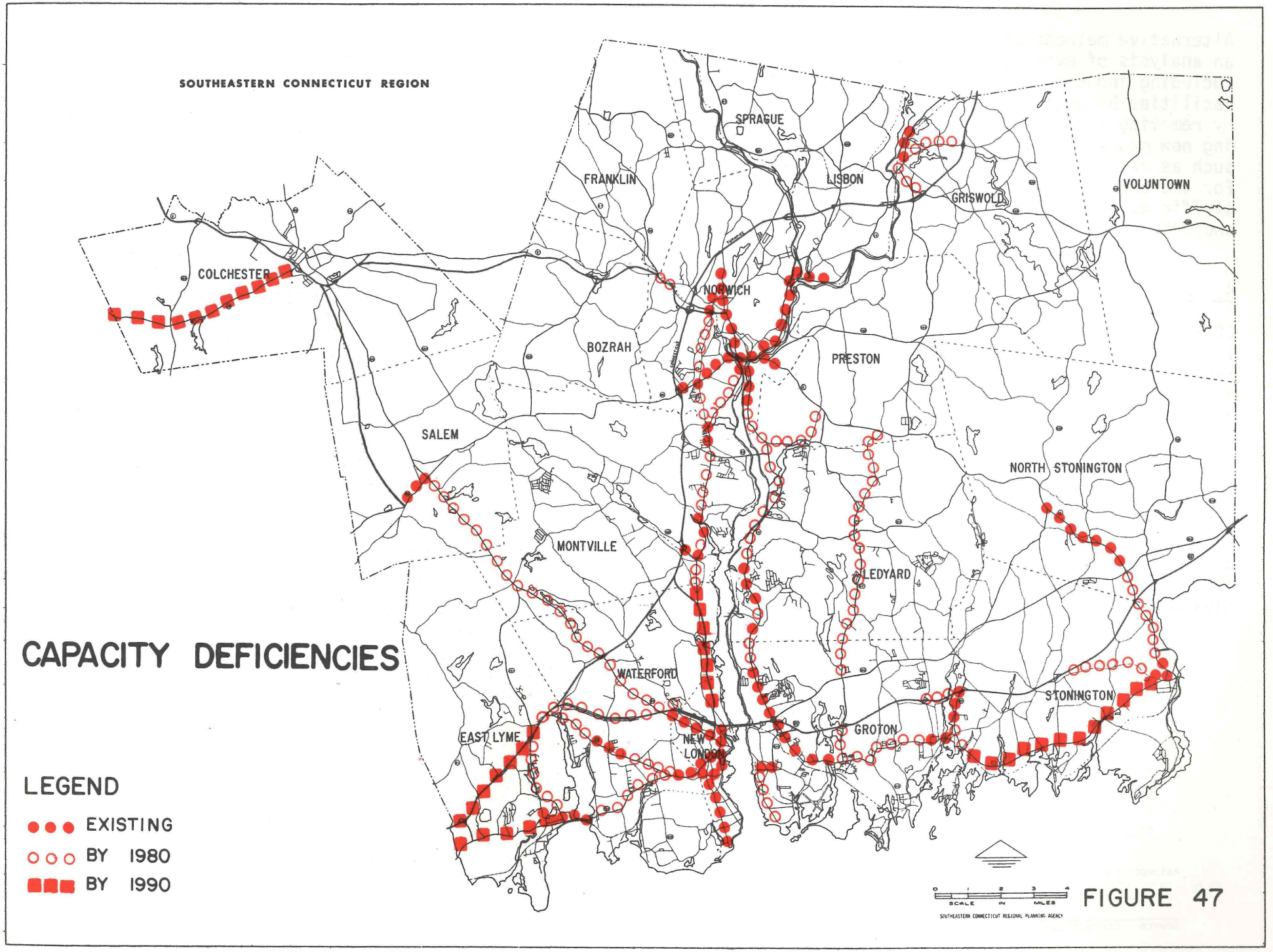

SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
NORWICH
BOZRAH
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
WATERFORD
STONINGTON
EAST LYME
NEW LONDON
GROTON
CAPACITY DEFICIENCIES
LEGEND
EXISTING
BY 1980
BY 1990
SCALE IN MILES
SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

FIGURE 47

Alternative methods of providing relief often include an analysis of extensive arterial street improvements, including inducing change in the use of other parallel facilities by upgrading the existing parallel routes, by removing tolls on toll facilities, or by introducing new modes of transportation on those corridors, such as rail, bus or ferry, where heavy travel exists. For the short-range, measures like car pooling or traffic operations improvements, can be undertaken where heavy traffic exists now.

4. Capacity Considerations

CONNDOT has developed capacity values for arterial roads which could be applied to all facilities in the region for simplification. The figures shown in Table 44 should be used cautiously, as the basic assumption is that present alignment is adequate, both vertically and horizontally. In practice, these conditions do not exist throughout the system. The capacity is based on available traffic lanes rather than roadway width. In urban areas the capacity values are based on the intersection approach width of the arterials. Consideration should also be given to turns, trucks and buses. These values should be used only for the specific prupose of determining potential deficiencies on existing facilities.

TABLE 44

ARTERIAL HIGHWAY CAPACITY (ADT)

Roadway Width, Feet	Number Of Lanes	With On-Street Parking	No On-Street Parking
20-30	2	4,000 - 8,000	7,600 - 13,600
40-50	4	12,100 - 15,900	18,200 - 22,700
60-70	6	18,200 - 23,500	25,800 - 32,600

Assumptions: 60 - 40% directional split
11 - 13% of daily travel in peak hours

Source: Connecticut Department of Transportation.

5. Traffic Accident Analysis

Most of the accidents in the region have occurred in the New London, Groton, and Norwich areas. Analysis indicates that most of the accidents occurred due to a conflict of access with the multi-lane moving traffic. Many studies relating design elements to accident costs have indicated in their findings that 4-lane highways had higher accident rates than 2-lane highways when there was no median divider and no access control. Figure 12 indicates the accident locations on major state highways in the region. Route 32 in Waterford and New London, and Route 12 and U.S. Route 1 in Groton have frequent accidents due to inadequate median or access control on 4-lane roads. There were 11,157 traffic accidents recorded from the year 1969 to 1974 on the state highways in this region. The 1,702 miles of state highways have taken a toll of 178 people in this five-year period and 7,715 people were injured. Physical improvements for safety will be suggested later in this report on locations prone to accidents.

6. Corridor Analysis, North/South

There are 3 parallel principal highways carrying north/south traffic. Route 52 (Connecticut Turnpike) is an expressway facility and Routes 32 and 12 are arterial roads. Accessibility in the area north of New London and Groton is principally through these 3 highways. (Figure 48.)

West of Thames River - Routes 32 and 52 carry north-south traffic west of the River. Route 32, an arterial, carries twice as much traffic between New London and Norwich as Route 52, an expressway. The primary reason for this is the existence of the Montville toll station on Route 52. The absence of access control and increasing development along Route 32 will continue to aggravate this already-congested road. Some traffic from points north of Norwich passes through the City, adding unnecessarily

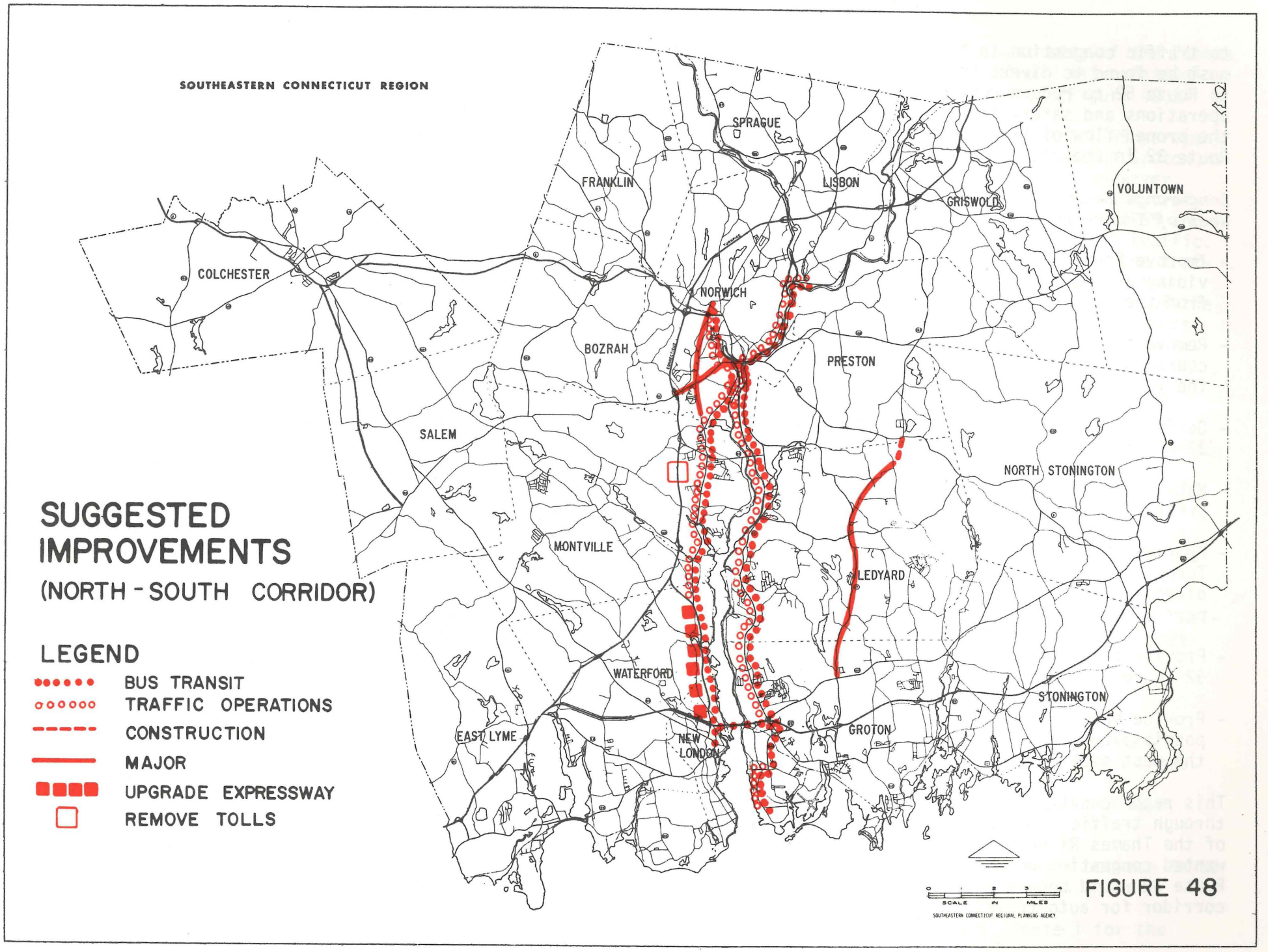

SOUTHEASTERN CONNECTICUT REGION
SUGGESTED IMPROVEMENTS
(NORTH - SOUTH CORRIDOR)
LEGEND
BUS TRANSIT
TRAFFIC OPERATIONS
CONSTRUCTION
MAJOR
UPGRADE EXPRESSWAY
REMOVE TOLLS
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
NORWICH
BOZRAH
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
WATERFORD
STONINGTON
EAST LYME
NEW LONDON
GROTON
SCALE IN MILES
SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

FIGURE 48

to traffic congestion in the urban area. A solution must be found to divert through traffic from Route 32 to Route 52 to reduce congestion on Route 32. Traffic operations and safety improvements should be made for the proper flow of traffic on the entire length of Route 32 in the region.

Long-range Recommendations - North/South Corridor, West of Thames River:

- Improve Route 82 in the City of Norwich, thus providing a good principal arterial line to Route 52 from the center of the City.

- Remove the toll on Route 52 in Montville, thus encouraging a diversion of traffic from Route 32 to the Turnpike.

- Designate New London Turnpike in Norwich as Route 32 and improve to arterial standards.

- Make Route 32 in Waterford and New London an expressway.

- Provide a southbound interchange on the Connecticut Turnpike at Old Colchester Road to permit more direct access to the Turnpike from the northeast part of Waterford.

- Provide frequent bus service on the existing Route 32 to relieve congestion for local traffic.

- Provide special commuter bus and investigate the possibility of rail service during peak hours on the west side of the river.

This recommendation will provide an expressway for through traffic from north to south on the west side of the Thames River. This would not only reduce unwanted congestion on Route 32 south of Norwich, but Route 32 would become a safer and more efficient corridor for auto travel.

Short-range Recommendations - North/South Corridor, West of Thames River:

- Provide spot improvements to Route 32 to improve traffic flow and safety.

- Designate New London Turnpike in Norwich as Route 32 from the Route 2 and 32 expressway south to where it joins Route 32 at Trading Cove.

- Improve New London Turnpike to arterial standards.

- Reduce the number of access points to Route 32 from local streets.

- Provide more bus service on Route 32, especially for commuters.

- Encourage greater use of car pools by commuters from points north of Norwich who work in the southern part of the region.

East of Thames River - Route 12 is the only major arterial highway for north-south travel east of the Thames River. However, Routes 117 and 164, along with other secondary roads, also accommodate some traffic from Ledyard, Preston, Griswold and points north of the region. Route 12 carries most of the traffic on the east side of the Thames River to the employment centers in Groton, where most of the region's people are employed. The very heavy traffic on this highway, coupled with continuous development along its frontage and the absence of access controls, demand immediate attention.

Long-range Recommendations - North/South Corridor, East of Thames River:

- Provide an additional corridor for north-south travel from Jewett City to Groton, by constructing a direct connection between Routes 117 and 164. This could be accomplished with a realignment of Church

Hill Road and Fanning Road in Ledyard and construction of an additional one-mile connection to the intersection of Route 164 with Route 2 in the Town of Preston.

- Reconstruct the total length of the realigned Routes 117 and 164 to arterial standards.

- Make spot improvements to Route 201 to make it safer for travel as a secondary route.

- Make traffic operations improvements to Route 12.

- Provide bus transit and commuter runs on Route 12.

These recommendations would allow more efficient use of existing facilities, provide better accessibility to the region's suburban residential areas, and the traffic would be better distributed.

Short-range Recommendations, North/South Corridor, East of Thames River:

- Provide spot traffic operations and safety improvements on Route 12.

- Provide spot widening and realignment of Route 117 on the entire length north of Route 184.

- Provide commuter and general bus service on Route 12.

- Provide car pooling facilities along Route 12.

Short-term solutions would help to relieve the existing congestion at peak hours on Route 12.

7. Corridor Analysis, East/West

I-95 is the only interstate facility in this region, and it serves both through and local traffic. On the east side of the Thames River, U.S. Route 1 parallels I-95, and serves the local and through traffic in Groton and Stonington. On the west side of the Thames River, Route 156 serves the local and intraregional traffic in East Lyme and Waterford. (Figure 49.)

East of Thames River - U.S. Route 1 and I-95 serves the subregional and through traffic between Groton, Stonington, and Westerly, Rhode Island. However, with the completion of the new Route 78, some traffic now on U.S. Route 1 will be shifted to I-95 and thus would relieve the congestion for local traffic. U.S. Route 1 in Groton carries the bulk of the traffic destined for the commercial areas of the town. This traffic generates many accidents because of the unrestricted access to the business establishments along the 4-lane route.

Long-range Recommendations - East/West Corridor, East of Thames River:

- Complete the construction of Route 78 between Route 2 and Route I-95 in Stonington.

- Construct service lanes on both sides of Route 1 in the commercial district of Groton or construct a median divider with turning lanes on the 4-lane sections of Route 1 in Groton.

- Provide sidewalks in congested commercial and residential areas in Groton and Stonington for pedestrian safety.

- Provide regular bus transit on Route 1.

- Make traffic operations improvements on Route 1, such as the coordination of traffic signal times.

Short-range recommendations - East/West Corridor, East of Thames River:

- Complete the construction of Route 78 between Route 2 and I-95 in Stonington.

- Make spot improvements on U.S. Route 1 for the

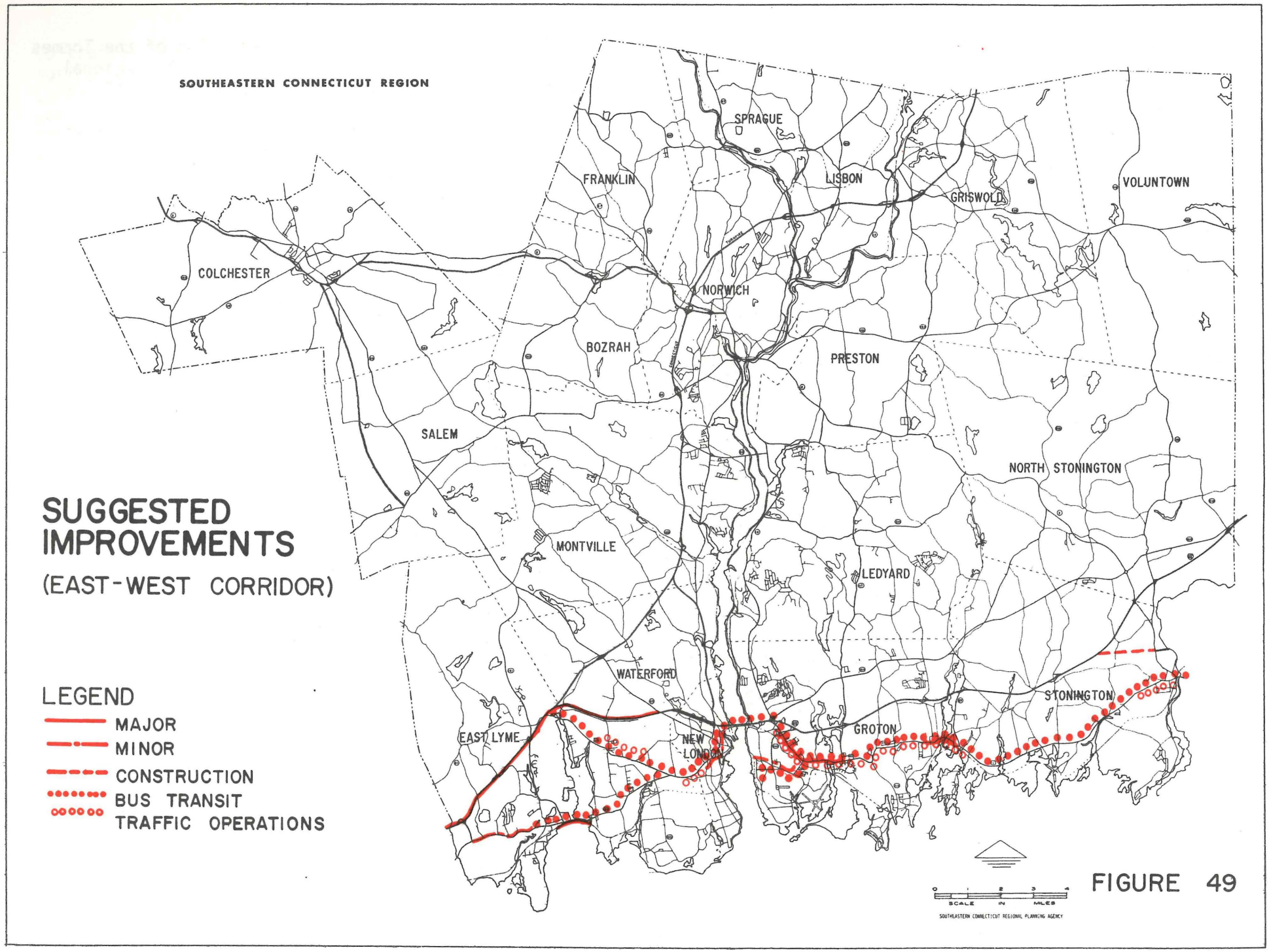

SOUTHEASTERN CONNECTICUT REGION
SUGGESTED IMPROVEMENTS
(EAST-WEST CORRIDOR)
LEGEND
MAJOR
MINOR
CONSTRUCTION
BUS TRANSIT
TRAFFIC OPERATIONS
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
NORWICH
BOZRAH
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
WATERFORD
STONINGTON
EAST LYME
NEW LONDON
GROTON
SCALE IN MILES
SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

FIGURE 49

smooth flow of traffic and for safety.

- Provide commuter bus transit in this corridor.

- Encourage car pooling programs.

- Provide regular bus transit on Route 1.

West of Thames River - Route 156 in the towns of East Lyme and Waterford is an arterial road for east-west traffic. This highway carries very heavy recreational traffic during summer months in addition to normally significant year-round traffic. The old movable bridge on the Niantic River is in very poor condition and creates major problems of congestion, but aesthetic and environmental considerations in the design of a new bridge have delayed its replacement. This road serves more traffic than it can carry.

I-95 west of the Thames River is a 4-lane expressway from where it enters the region in East Lyme to Route 85 in Waterford. The increase in through traffic and local traffic will further aggravate existing congestion on this section of the interstate highway.

Long-range Recommendations - East/West Corridor, West of Thames River:

- Provide two additional lanes on I-95 westward from the intersection with Connecticut Route 85.

- Improve the intersection of I-95 and Route 52.

- Reconstruct and realign Route 156 in Waterford.

Short-range Recommendations - East/West Corridor, West of Thames River:

- Make minor realignment, spot widening and traffic operations improvements to Route 156.

- Replace the Niantic River Bridge.

The bridge across the Niantic River should be especially designed to be compatible with the character and appearance of this part of our coastal area. It must adequately serve traffic needs, but it must also be aesthetically pleasing and enhance the specialized economic activities in the vicinity.

8. Corridor Analysis, Northwest/Southeast

The main routes of travel in this corridor are Route 2, which enters the region in Colchester and extends through Norwich and on to Westerly, Rhode Island, and Route 85 from Colchester to New London. The latter is paralleled by Route 11, an expressway, from Colchester to the center of Salem. (Figure 50.)

The expressway part of Route 2 is more than adequate to meet expected traffic requirements, except in the area of its juncture with Route 32 in Yantic. There are also problems associated with the expressway's abrupt end in Norwich. The major difficulties on Route 2 are experienced in Norwich where the local streets are inadequate to accommodate the daily volumes of traffic, and are completely overwhelmed by recreation traffic passing through the city on summer weekends. Through traffic is inhibited from using the Route 2A bypass south of Norwich because of the indirectness of the routing and the existence of the toll on the Mohegan-Pequot Bridge. East of Norwich, Route 2 is a well-constructed two-lane arterial as far as Route 201 in North Stonington, at which point the highway becomes less than adequate for most of the remainder of its length.

The principal route used between Colchester and New London is Route 11, an excellent expressway which should meet traffic needs in this section for many years to come, and Route 85, a sub-standard two-lane arterial road. As stated earlier, Route 11 construction has been completed only between Route 2 in Colchester and Route 82 in Salem. Through traffic must travel about a mile on Route 82 between Routes 11 and 85.

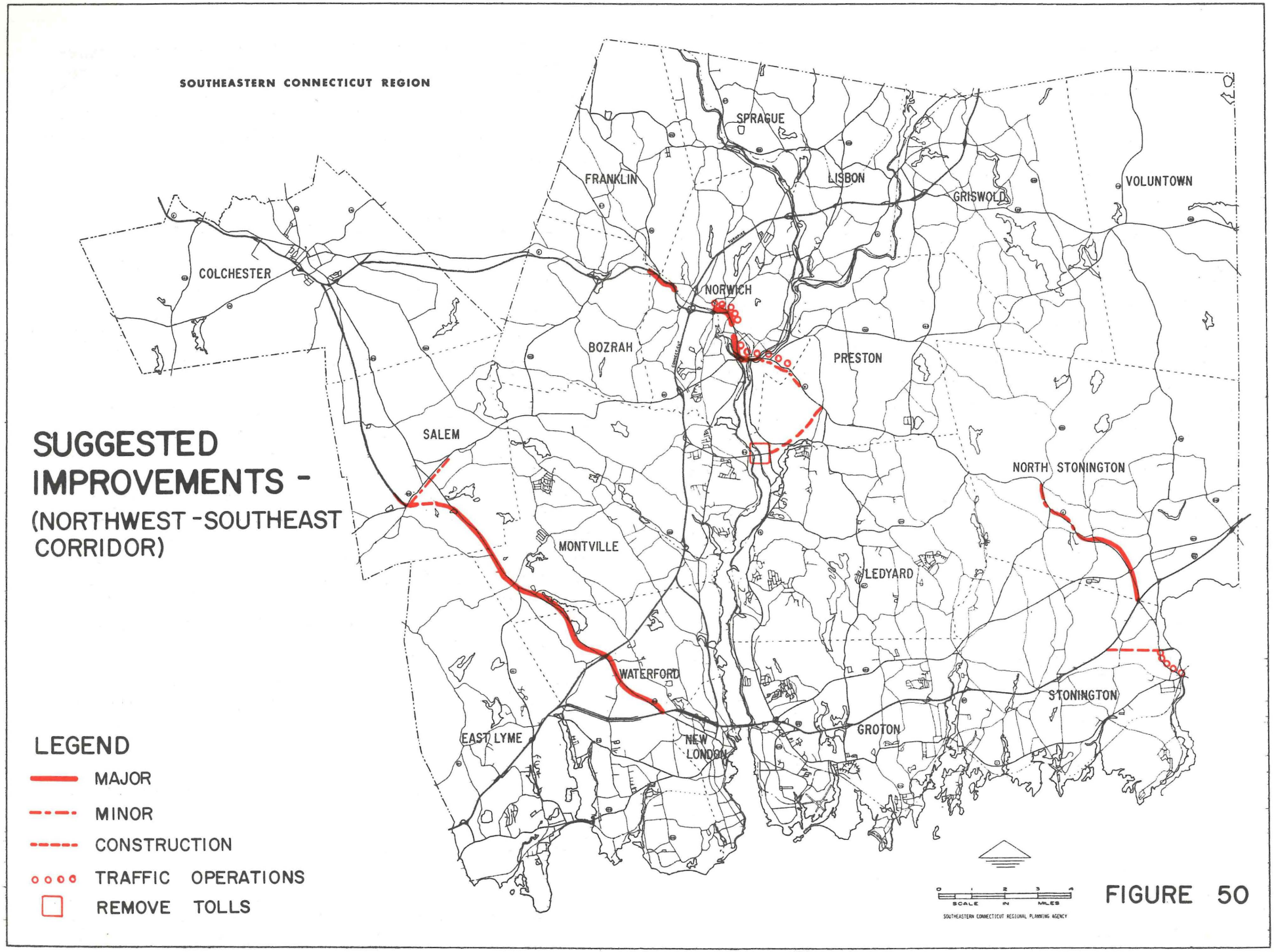

SOUTHEASTERN CONNECTICUT REGION
SUGGESTED IMPROVEMENTS -
(NORTHWEST - SOUTHEAST CORRIDOR)
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
NORWICH
BOZRAH
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
WATERFORD
STONINGTON
EAST LYME
NEW LONDON
GROTON
LEGEND
MAJOR
MINOR
CONSTRUCTION
TRAFFIC OPERATIONS
REMOVE TOLLS
SCALE IN MILES
SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

FIGURE 50

Traffic conditions on this corridor are most severe on summer weekends when recreation travel is heavy. Recreation traffic is expected to increase by 42% during the period from 1970 to 1990. This increase will create severe traffic congestion in Norwich as well as on the lower part of Route 85 and on the eastern end of Route 2, necessitating major improvements.

Long-range Recommendations - Northwest/Southeast Corridor, Route 2:

- Provide a convenient bypass to the City of Norwich for Route 2 by completing the construction of Route 2A in Preston and removal of the tolls on the Mohegan-Pequot Bridge.

- Upgrade the interchange of Routes 2 and 32 in the vicinity of Yantic.

- Upgrade Route 2 in the eastern part of North Stonington and in Stonington.

Short-range Recommendations - Northwest/Southeast Corridor, Route 2:

- Make minor improvements to Route 2 in the eastern part of North Stonington.

- Modernize the Washington Square intersection in Norwich.

- Undertake traffic operations improvements in the City of Norwich on Route 2.

- Improve informational signs that would direct through traffic around Norwich on Route 2A.

Long-range Recommendations - Northwest/Southeast Corridor, Routes 11 and 85:

- Join Route 11 to Route 85 at a suitable point in Salem or Montville.

- Improve Route 85 from the point of joining with Route 11 to Route I-95 as a principal arterial.

- Modernize the interchange between Routes 85 and I-95.

Short-range Recommendations - Northwest/Southeast Corridor, Routes 11 and 85:

- Improve the section of Route 82 between Routes 85 and 11.

- Make minor improvements to Route 85 south of Route 82.

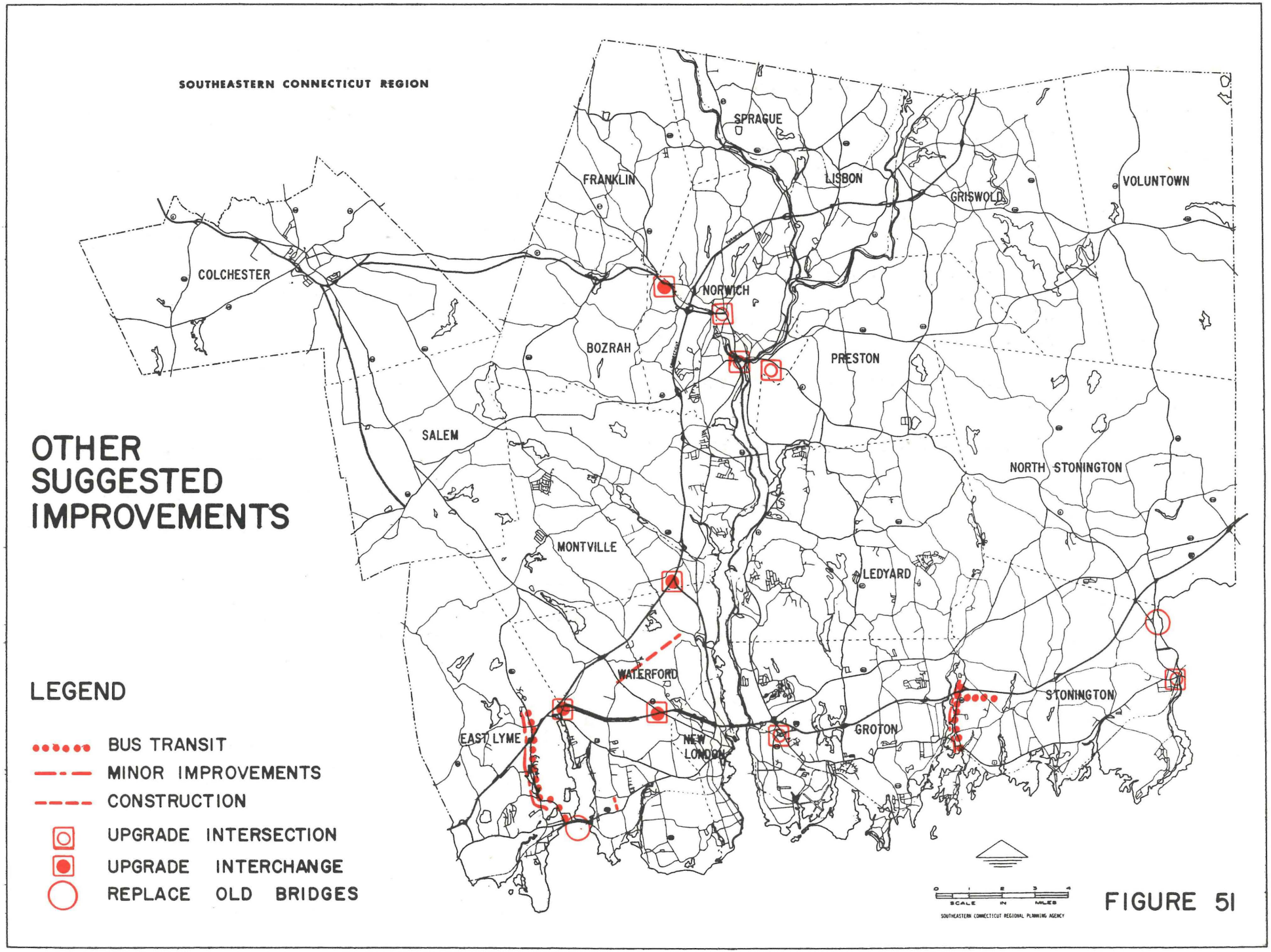
- Modify grade intersections with local roads as needed on Route 85.

9. Other Specific Highway Facility Recommendations

Many other highway facilities in the region are in need of significant improvement, and, in some cases, new facilities are needed. (Figure 51.)

Route 27 - Traffic on Route 27 in Stonington is increasing every year due principally to the increasing number of tourist attractions being constructed in this area. Since there is very little room to widen the existing Route 27, the short-term recommendation for improving the existing situation is the construction of sidewalks for pedestrians and establishment of a bus shuttle service during summer months between the I-95 interchange area and Mystic Seaport. The suggestion made by Mr. James Spellman, the First Selectman of Stonington, that the lanes on Route 27 between Coogan Boulevard and Jerry Brown Road be rearranged would ease the traffic flow at the intersection of Coogan Boulevard and Route 27. This should be given immediate consideration.

A long-range solution to the problem of moving people


SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
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PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
WATERFORD
STONINGTON
EAST LYME
NEW LONDON
GROTON
OTHER SUGGESTED IMPROVEMENTS
LEGEND
BUS TRANSIT
MINOR IMPROVEMENTS
CONSTRUCTION
UPGRADE INTERSECTION
UPGRADE INTERCHANGE
REPLACE OLD BRIDGES
SCALE IN MILES
SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

FIGURE 51

and goods along Route 27 should be based on a comprehensive study of the Mystic River area. Future land use desires, parking requirements, mass transit options and many other factors need to be studied in order to effect a workable solution to the problem. Unless land use planning and control is closely coordinated with traffic planning in this critical area, no solution to the problem will be lasting.

Waterford Links - There has long been a need to link the Quaker Hill area of Waterford with the remainder of the town. Such a route would avoid the present circuitous and lengthy route that one must travel in lieu of such a link.

Another linking roadway is needed near the southern end of Spithead Road in Waterford to form a more direct connection with Gardners Wood Road at Route 156. This local corridor is receiving increasingly heavy traffic, strongly influenced by the expansion of the Millstone Point Generating Station. A direct linking of Spithead Road with Gardners Wood Road would take a significant amount of traffic off Route 156 in this critical area and enable traffic control measures to be more conveniently effected on Route 156.

Old Bridges - Numerous highway bridges throughout the region are inadequate to support modern traffic weights or are not wide enough for two-way traffic. The replacement of these structures should be undertaken through a staged improvement program.

10. Other General Highway-related Recommendations

- Each of the region's larger communities should have the capability to conduct continuous transportation planning and designing as part of the local general planning activities. This can be accomplished only through the establishment of full-time transportation planners in these communities.

- Detailed studies of heavily-traveled traffic corridors should be undertaken, involving multi-modal concepts in order to achieve a balanced transportation system.

- Local governmental agencies and CONNDOT should exercise greater control over land use along major traffic arteries, especially as it relates to access locations, numbers, and design.

- Greater attention should be given to the appearances and clarity of traffic signs. Large numbers of signs, varying in design and legibility, create visual clutter and driver confusion throughout the region. The lack of architectural and environmental considerations is all too apparent in the area's highway signs.

- Old Colchester Road in Montville and Waterford and New London Turnpike in Norwich, both of which carry significant amounts of regional traffic, should be transferred to state control.

- The concept of applying a direct tax on the users of certain highways by charging tolls is no longer valid and should be eliminated on the region's two remaining toll facilities, the Mohegan-Pequot Bridge and the Connecticut Turnpike. The tolls create an imbalance in traffic patterns in that some facilities become overloaded while the toll routes are underused. This is an inefficient use of resources, it is not environmentally acceptable, and it wastes energy.

- Transportation planning capabilities should be strengthened at the regional level, especially in the area of problem analysis. Greater coordination is needed between the CONNDOT's planning division and the SCRPA staff. In addition, CONNDOT's informational systems should be designed to permit compilation of all data by regions or parts thereof.

VIII. PARKING

Parking is a major urban land use. Anyone who drives a car needs no introduction to the difficulties of finding a parking space in areas which are intensively used for industrial, business, commercial, or residential purposes. The best example in the region could be at Electric Boat in the industrial area of the City of Groton, where about 18 thousand people work and parking is a major problem.

The terminal, the roadway and the vehicle are the basic elements of the highway transportation system. The planning and design of each element influences the performance of the total system.

The parking problem becomes more pronounced as the density and size of the urban area increases. Historically, expenditures for parking facilities have not kept pace with those for highways, and the lack of balance in investment has compounded the traffic congestion. Moreover, it is not clear whether provision of parking is the responsibility of the public or the private entrepreneur.

This region's principal parking problems exist in three urban communities of Norwich, New London and Groton. The biggest concentration of problems is at Electric Boat in the City of Groton.

A. URBAN PARKING CONDITIONS

Various parking studies were conducted in the three urban communities as a part of the TOPICS program. For a detailed inventory of all parking spaces, including curb and off-street facilities, both private and public, TOPICS and other studies of the respective municipalities should be examined. A summary of existing conditions follows.

1. Norwich

The total number of parking spaces available, as determined by the inventory, is 1,660. Of these, 387 are curb and 1,273 are off-street parking spaces. For locations of off-street parking in the Norwich central business district, see Figure 52.

2. New London

The total number of parking spaces available for the City of New London is 2,371. Of these 373 are on-street metered and about 2,000 are off-street parking. For location of off-street parking and the capacity of each, see Figure 53.

3. City of Groton

The City of Groton faces an extreme parking problem in its industrial area where about 20,000 people are employed.

The total off-street parking spaces provided by EB and Pfizer will accommodate about 10,425 vehicles. The limited on-street parking spaces, plus smaller private lots, contain about 500 spaces. For locations and capacities of lots, see Figure 54.

4. Town of Groton

The total off-street parking spaces both private and public provided by various businesses on the shopping

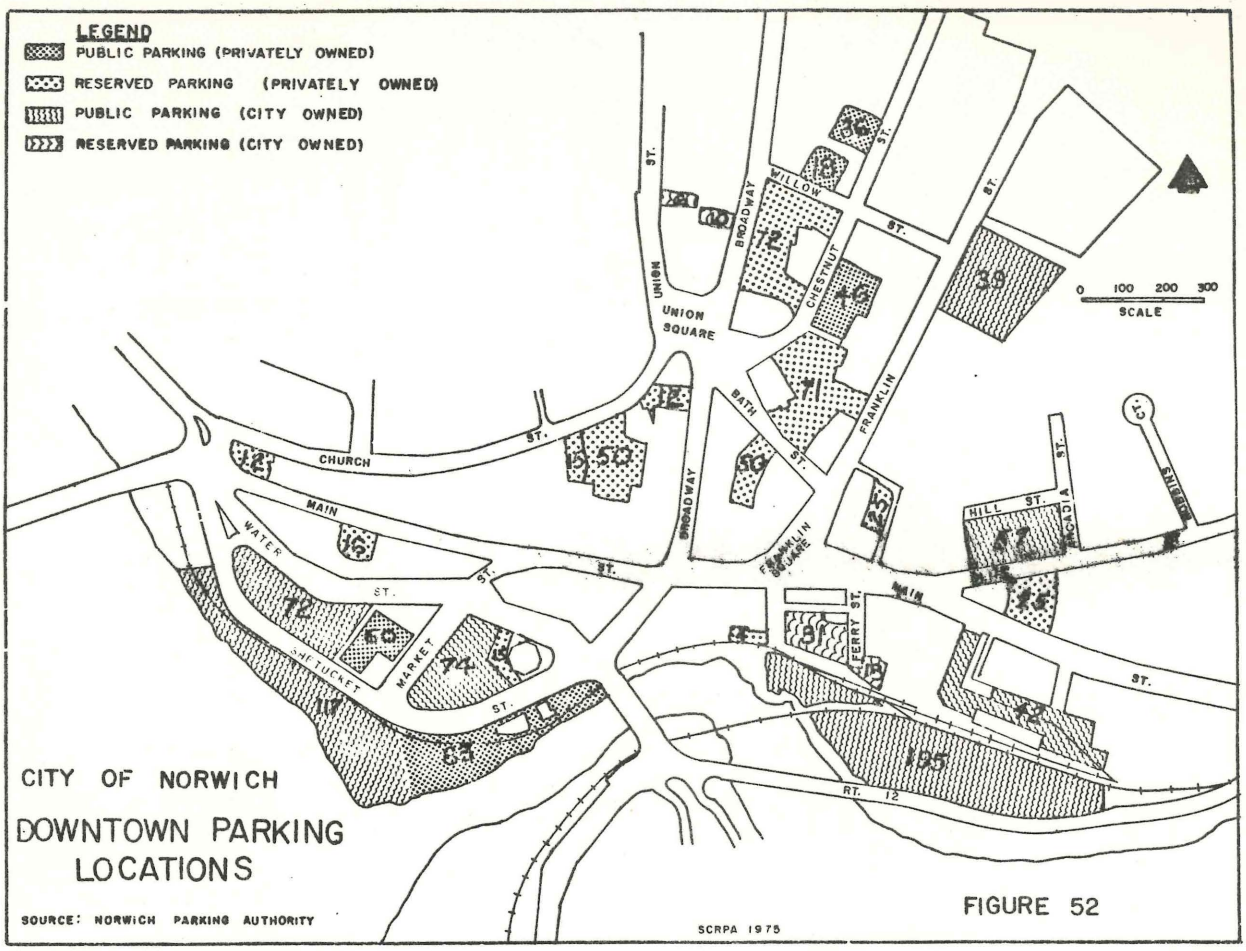


FIGURE 52

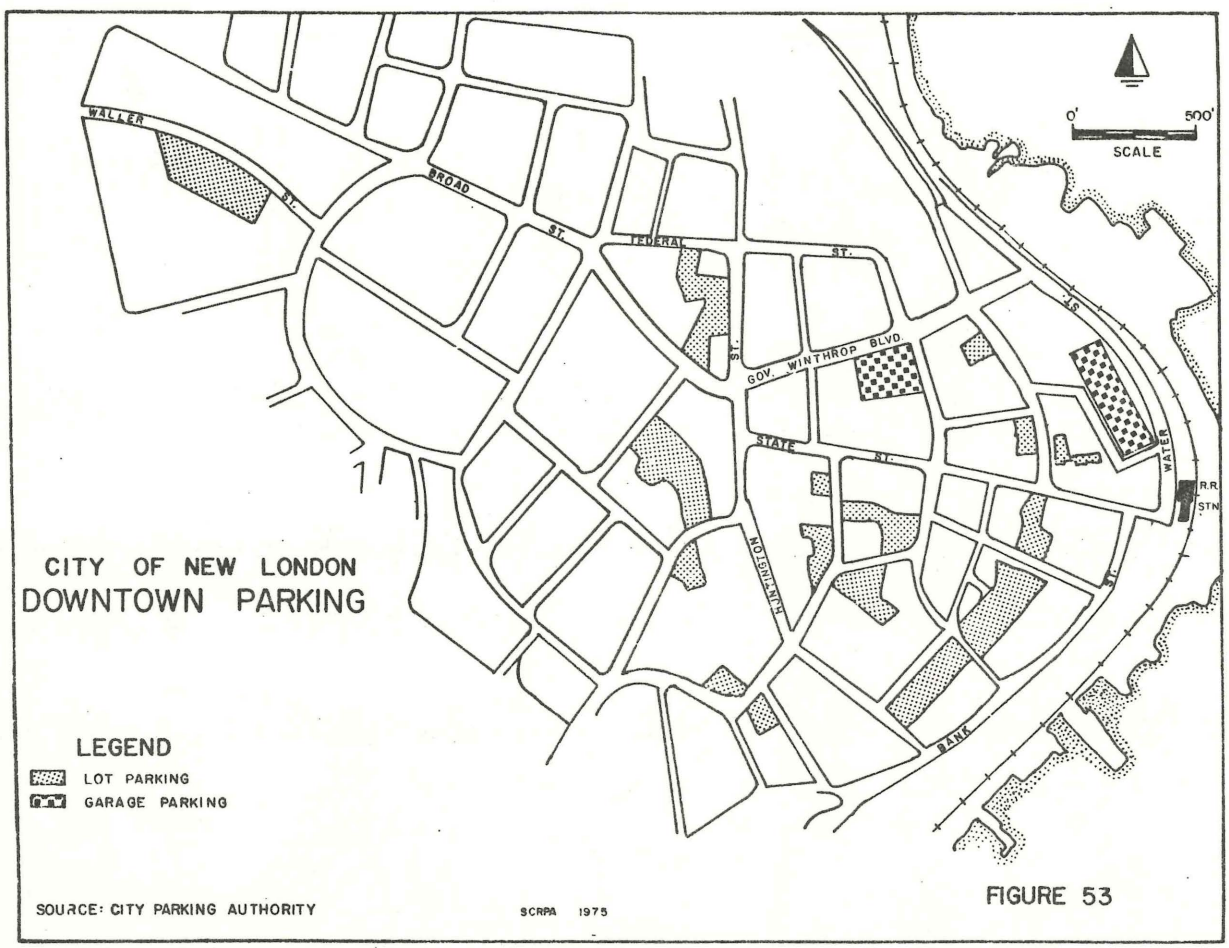


FIGURE 53

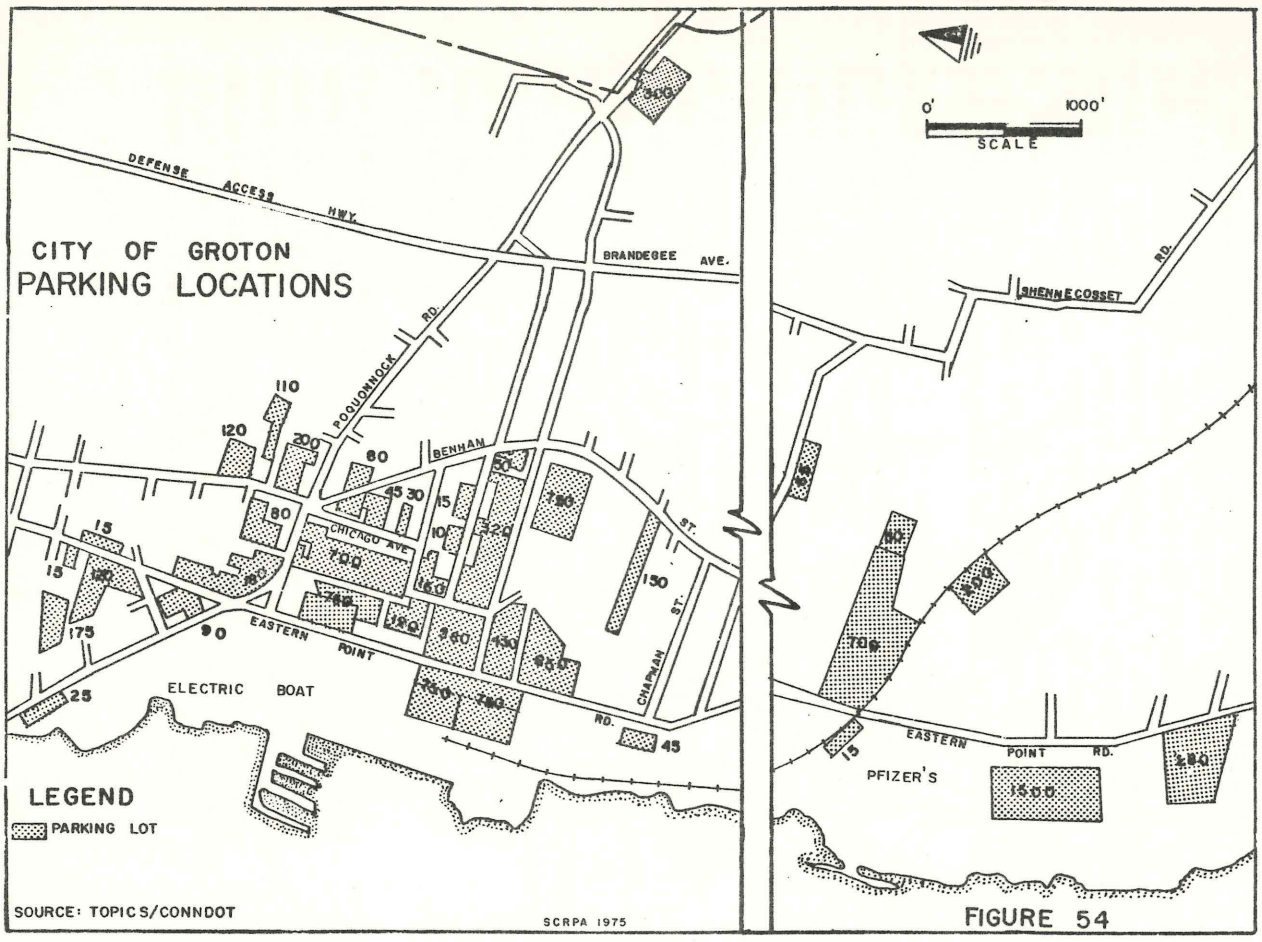


FIGURE 54

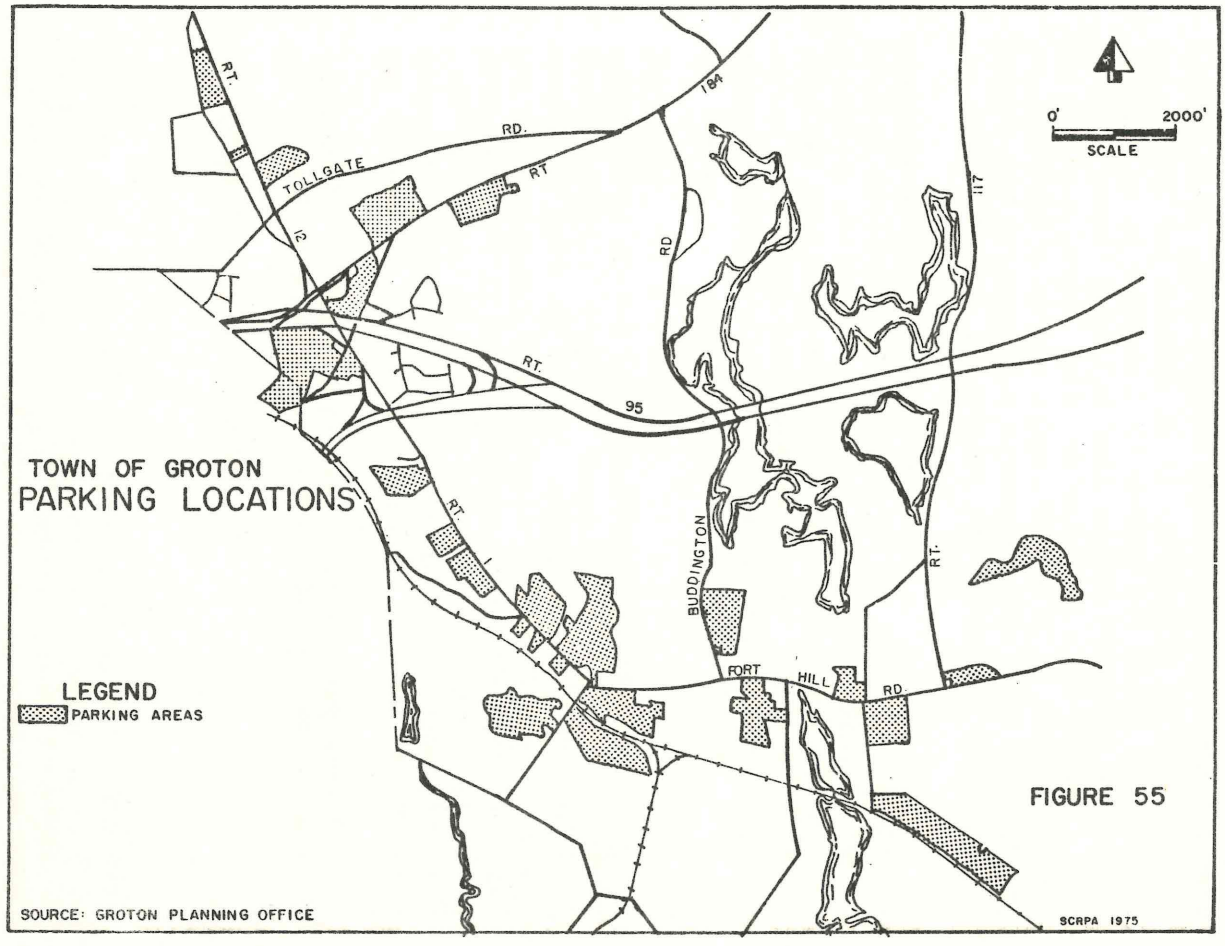


FIGURE 55

center and their individual lots is about 7,368. (For location see Figure 55.) In addition there are about 150 on-street parking spaces in West Mystic.

B. FRINGE PARKING

Based on statewide surveys conducted by CONNDOT in 1970, the average number of persons per automobile entering or leaving the major cities during the peak hours was 1.4. (The figure was only 1.24 persons per vehicle in this part of the state.) The capacity of most automobiles is between four and six persons, depending on the type of vehicle.

By the construction of fringe parking facilities outside the urban centers, people are encouraged to park and ride with someone else or to take bus or rail transit if it is available. A massive commuter parking program that encourages both car pooling and transit ridership should reduce auto congestion. Such parking places can be provided at highway interchanges or through the use of existing parking facilities. A large number of such facilities should help to increase the car occupancy factor and could increase bus ridership when such service becomes available. Local agencies should encourage shopping centers and churches to allow commuters to park their cars on their premises. Where commuter parking is permitted in commercial areas, increased sales could result.

The Connecticut Department of Transportation initiated the interchange parking lot program in an effort to provide convenient and safe locations for commuters to park their cars and "pool" their driving to reduce automobile traffic. In the Southeastern Connecticut Planning Region, there are a total of thirteen commuter interchange parking locations. As of this writing, nine of these lots are paved. Figure 56 indicates the locations and capacities of these lots throughout the region.

Because of the recent energy crisis, the public is responding well to the concept of car-pooling by making use of existing parking lots and other available open spaces for parking. SCRPA proposes 16 new commuter parking lots throughout the region. Figure 56 also indicates the locations and capacities of these proposed lots.

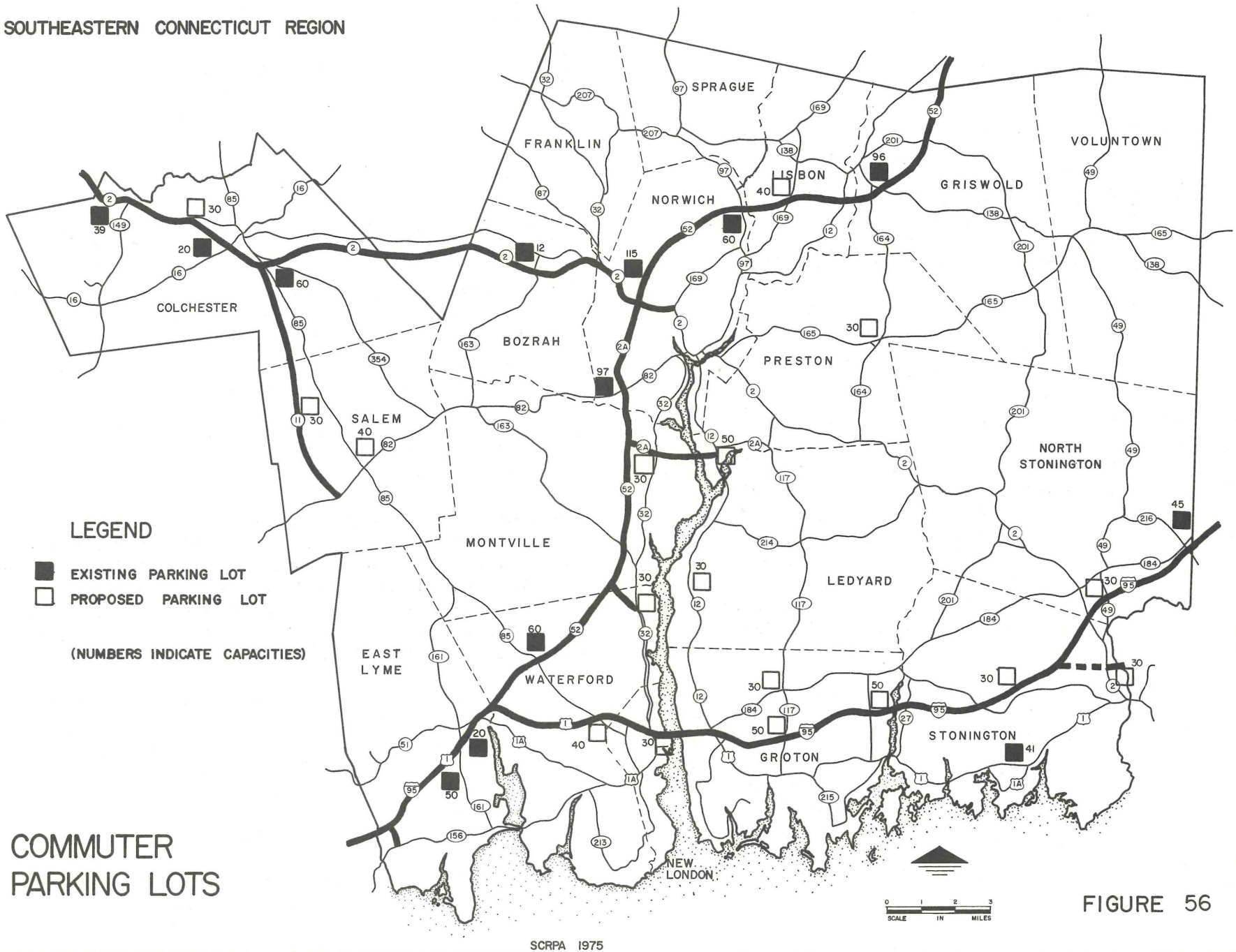
C. COMMERCIAL SITE PARKING

The following discussion is abstracted from SCRPA's 1973 report "Commercial Sites: Design and Review."

All commercial enterprises along a highway or on newly developed land should have adequate off-street parking. From the point of view of the store operator, he will do more business if his customers feel that they can reach his establishment conveniently and safely and be able to park when they get there. From the point of view of the general public, adequate parking will decrease congestion, again making for improvement in safety and convenience.

The amount of parking required varies with the type of establishment and its size. A theatre obviously requires more than does a barber shop. It is important that the zoning commission understand the kinds of information necessary to make a proper estimate of the parking requirements in order to be able to properly evaluate proposed site plans.

For some types of businesses the amount of parking required can be estimated directly from their capacities. Examples would be the number of seats in a restaurant, chairs in a barber shop, machines in a laundromat, etc. In such cases, once the peak demand has been established, it is necessary to decide how often this peak will occur and whether it is reasonable to permit construction of fewer parking spaces because such a demand would only occur infrequently. In other cases, such as hardware, liquor or furniture stores, the actual parking demand is more difficult to predict.



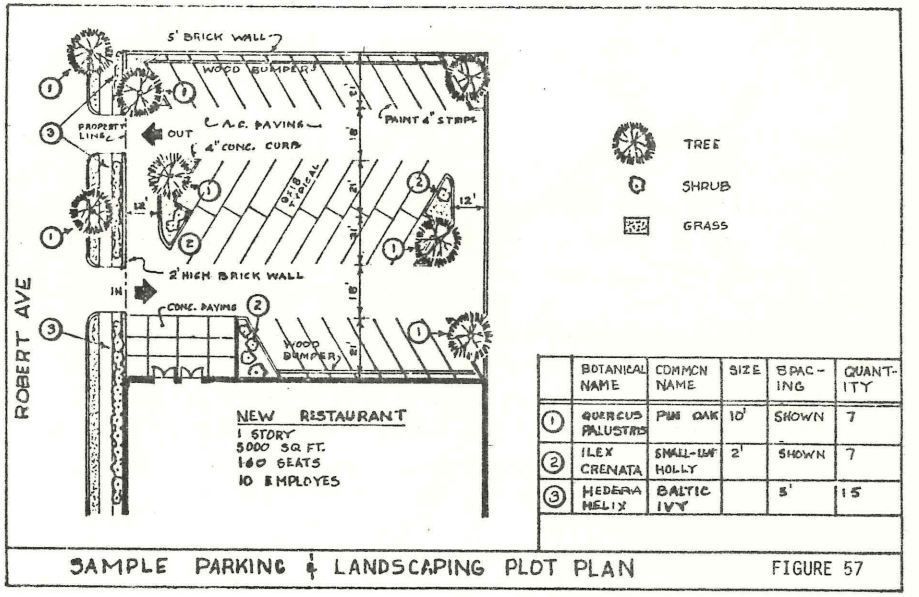
COMMUTER PARKING LOTS

FIGURE 56

In large shopping centers, where a customer usually shops in more than one store per trip, it has been found that 5.5 parking spaces per 1,000 sq. ft. of gross store floor area is adequate for the entire year except at the peak of the Christmas rush. [PARKING REQUIREMENTS FOR SHOPPING CENTERS. Urban Land Institute, 1965.] However, less than that would seem logical for an independent store where customers only park for a short time to make one purchase. Also, there are some establishments, like furniture stores, that have a large amount of floor space per customer. A very small establishment such as a variety and newspaper store might well require more than 5.5 spaces per 1,000 square feet.

In small scale development a parking lot is not usually large enough to require special treatment to visually cut down its size in order to improve the pleasantness of the shopping experience. However, the stalls and travel lanes should be clearly indicated by painting on the pavement.

The site plan in Figure 57 shows many aspects of parking lot design. Notice the trees planted in the islands at the ends of the rows, and the planting along the sidewalk. Also the wooden bumper guards on the building and around the perimeter of the lot. The stalls are indicated on the pavement with painted stripes. The lot is enclosed with low masonry walls which will do much for the overall appearance. The types of plant materials to be employed are specified. This is but an example of the kind of parking plan that it is possible to have.



	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	QUANTITY
①	QUERCUS PALUSTRIS	PIN OAK	10'	SHOWN	7
②	ILEX CRENATA	SMALL-LEAF HOLLY	2'	SHOWN	7
③	HEDERA HELIX	BALTIC IVY		5'	15

SAMPLE PARKING & LANDSCAPING PLOT PLAN FIGURE 57

IX. BICYCLE

In recent years America has experienced an unprecedented boom in bicycle sales and use. In 1972, 13 million bicycles were sold, 2 million more than automobiles, and about half were sold to adults. In 1973 14 million bicycles were sold. [BICYCLE TRANSPORTATION, U.S. Environmental Agency, December, 1974.]

Much of the general public does not fully appreciate the advantages the bicycle offers. The bicycle offers mobility and, literally, door to door service at speeds comparable to auto travel in high density urban areas. It is not an expensive form of transportation. A serious problem is that motorists do not recognize the fact that bicycles are a legitimate mode of transportation. This attitude can be changed through education and legislation, which will give the bicycle status as a legitimate mode of transportation. The major deterrents to cycling are high accident rates, insufficient parking facilities, exposure to air pollutants, and bad weather conditions.

A. TRIP PURPOSE

Wherever surveys for bicycle trips have been conducted, most of the bicycle trips fall into the following four categories.

1. Utilitarian. These trips are made to and from work, school, or shopping. They are short trips, ranging under 2 miles and occur at regular intervals.

2. Neighborhood riding. This type of bicycle riding is done by children mostly within their neighborhoods, especially for pleasure or play.

3. Recreation. Recreational trips are those made by people of all ages for relaxation, exercise and leisure activities. These trips range from short to medium distances, 2 to 10 miles. Cycling is usually made within recreational facilities or along scenic routes.

4. Sport. This includes racing, training, and related activities.

B. USER CHARACTERISTICS

It has been a common understanding that bicycles are primarily for the use of children. Recently, however, the bicycle has become an attractive mode of transit for the adult. Its greater use has been noted near academic areas. The predominant users of bicycles are middle to upper class. Males of all groups participate more than females.

C. TYPES OF BICYCLE FACILITIES

One of the better solutions to the bicycle safety problem is to separate the bicycle from motor vehicle travel as much as possible. This can be achieved through the construction of bikeways. The bicycle facilities can be classified into three distinct classes: (1) exclusive bikeways, (2) shared bikeways, and (3) bike routes. These are illustrated in Figure 58.

D. REGIONAL BIKEWAY SYSTEM PLAN

The Connecticut State Department of Transportation has prepared a statewide bikeway plan. The plan, as related to Southeastern Connecticut, is shown on Figure 59.

The entire system has been divided into three phases. These were developed to provide a logical order of implementation.

1. First Phase. The first phase is composed of primary routes which will be used for recreational purposes. The routes are generally located in heavily developed areas, where there is an existing or potential high rate of bicycle utilization.

2. Second Phase. The second phase is composed of secondary routes which are intended for utilitarian and recreational use. The areas through which they pass have existing or potential bicycle use patterns. But the usage is not extensive enough to warrant high implementation priority. The second phase extends and connects areas served by the first phase.

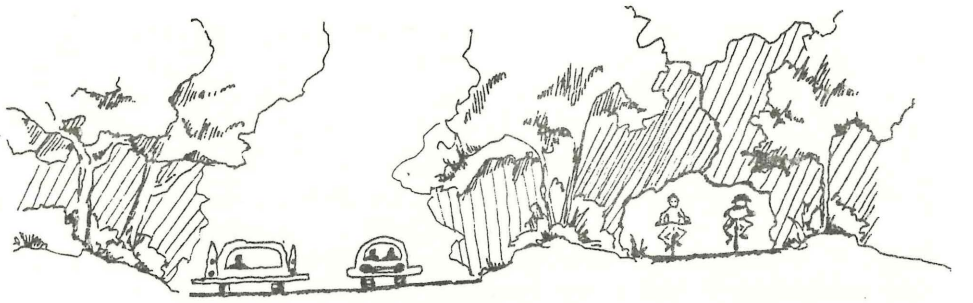
3. Third Phase. The third phase will serve primarily recreation needs. These will, of course, have some utilitarian use too, but not so much as the first and second phases. These routes are located in highly developed rural areas. These are to serve as connectors filling out the system into one interconnected unit. The comparatively small need and use potential are the reason for the lower priority.

E. EXISTING BIKEWAYS

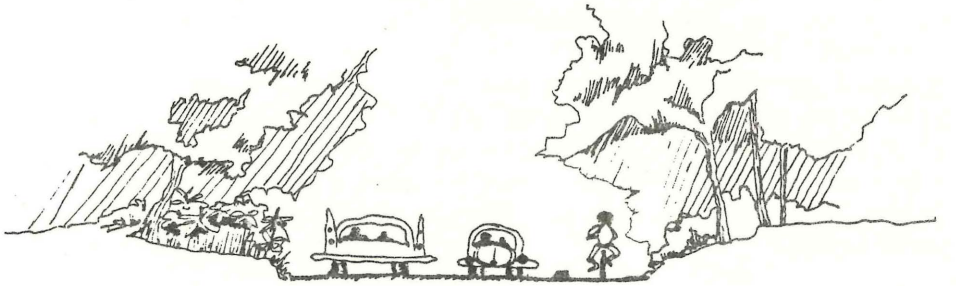
1. City of New London. The City of New London, through an ordinance, has designated some of its local roads as bike routes, and has painted stripes and instituted signs to clearly mark the bike lane.

2. Town of Groton. In September of this year, the Groton Planning Office, through the efforts of a landscape architecture graduate student, has prepared a report on a bikeway system for the town. The proposed system has been organized into three separate (but interconnecting) phases for implementation. A demonstration project in the Town of Groton is also being implemented in conjunction with local bikeway

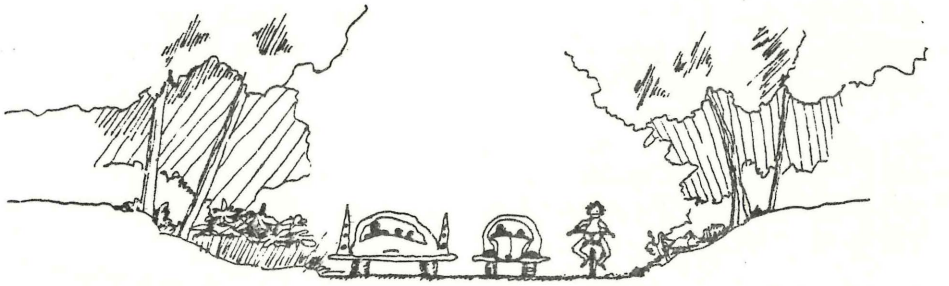
BIKEWAY CLASSIFICATIONS



CLASS 1 - EXCLUSIVE BIKEWAY



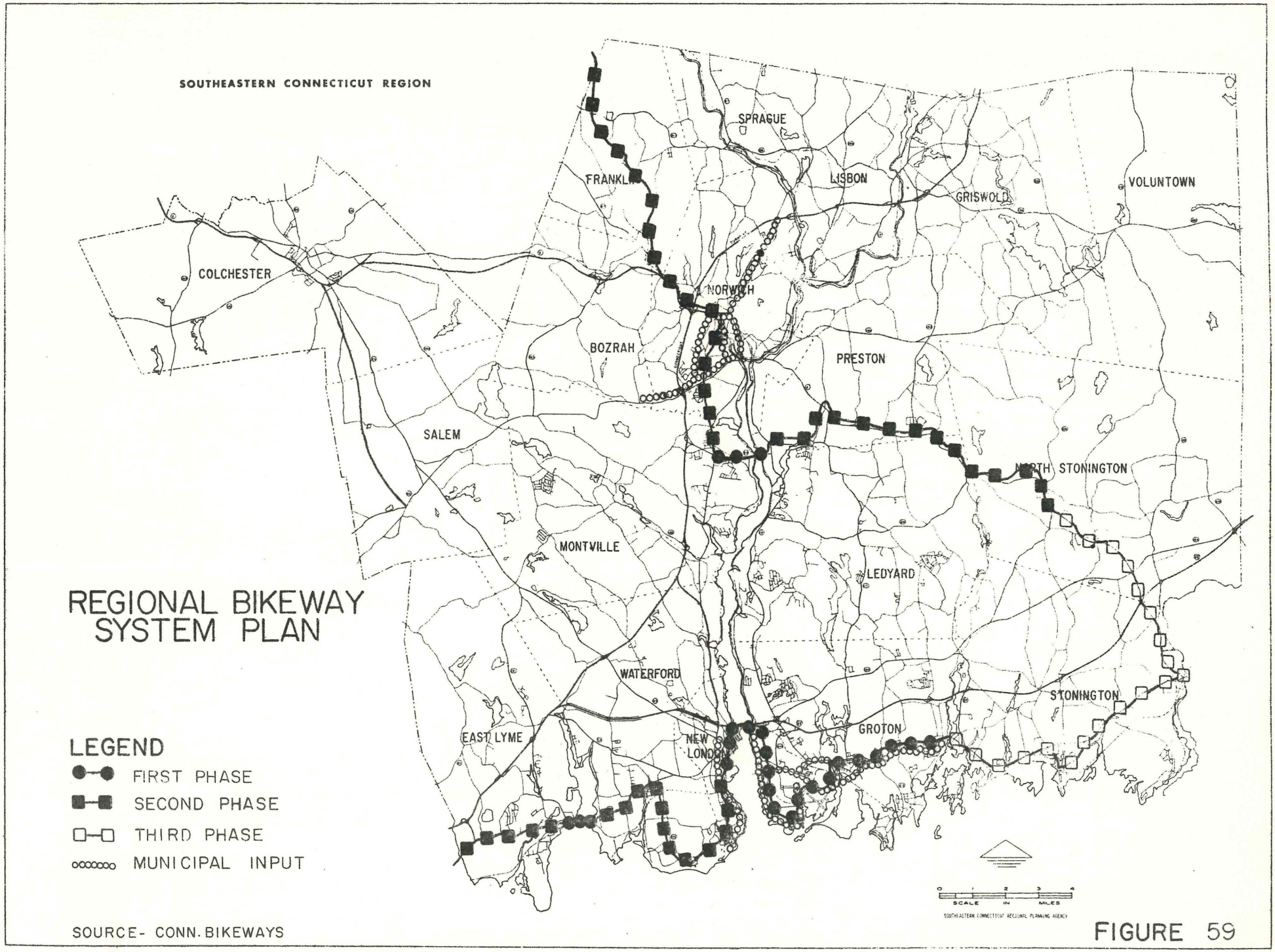
CLASS 2 - SHARED BIKEWAY



CLASS 3 - BIKE ROUTE

FIGURE 58

SOURCE: Groton Planning Office.



SOURCE- CONN. BIKEWAYS

FIGURE 59

development through the designation and painting of stripes for the bike lanes.

F. RECOMMENDATIONS

1. Abandoned rights-of-way, utility rights-of-way and local roads should be explored for the possible construction of or designation as bikeways. [See SCRPA's 1974 report: PROPOSED BICYCLE TRAIL, SOUTHEASTERN CONNECTICUT.]

2. Parking facilities in public places such as shopping centers and transportation terminals or bus stops should be allocated for bicycle parking.

3. Demonstration projects on local roads in the urbanized areas should be undertaken through the readjustments of road rights-of-way.

4. Towns should consider designating certain local roads as recreation bikeways and restricting automotive traffic on them during specific periods of the day or on weekends.

X. BUS

Bus transit has long played a vital role in the transportation system. However, in more recent years the versatile mobility offered by the automobile has been the cause of declining patronage, resulting in reduced service and more operating difficulties. Now it is becoming increasingly evident that Southeastern Connecticut cannot depend solely upon the automobile to accommodate travel demands, and buses have the potential of helping to relieve problems associated with transportation, thus helping to develop a balanced system.

Increased use of buses will reduce terminal parking requirements in major employment and shopping areas and in the central parts of Norwich, New London and Groton. It will also relieve increasing traffic congestion, improve safety in selected corridors during peak hours, help the travel needs of people without access to automobiles, reduce energy consumption, and reduce pollution from traffic sources. In addition, those members of the region's population disadvantaged because of a lack of personal transportation will gain greater mobility.

A. EXISTING BUS SERVICE

1. Local. Intracity bus service is available in Norwich and New London. The level of service provided at present is not enough to function as an effective local bus service. The cities and state DOT contribute to the deficit in operating cost.

2. Intercity. The only intercity bus service available is between Norwich and New London run by Savin Bus Lines. The service is not available in the early morning and late evening hours.

3. School Buses. School bus service is provided by each of the 18 towns. The system is adequate, but is tremendously expensive to the towns. Table 2 in Chapter III outlines the cost incurred by each town and the number of children transported.

4. Senior Citizen Buses. Seven towns in the region operate senior citizen bus service with federal funds and/or with local contributions. Table 1 in Chapter III presents data on these expenditures.

5. Interregional. Greyhound Bus Lines presently provides service from New London to Westerly and Providence. In addition, they provide service between New London, New Haven and New York. Commuter service between New London and New Haven ("Clamdigger" service) has recently been reinstituted by CONNDOT. Savin Bus Lines operates this service, making one round trip daily between the two cities. Eastern Bus Lines offers daily service between New London and Hartford, going through Colchester. The Blue Line, Inc., provides three-day (Friday, Saturday and Sunday) service between New London, Norwich, Willimantic and Springfield, making scheduled stops in other communities along the route.

Several private bus companies offer commuter service to workers in the region. The Barstow Bus Company provides weekday service from Attawaugan in Killingly to Electric Boat. The Corbin Coach Company offers commuter service from New Britain, through East Lyme, to Electric Boat. East Lyme is the only stop made in the region. Service is provided from Rhode Island to Electric Boat by the Pawtuxet Valley Bus Lines. Since no scheduled stops are made in the region except for the stop at Electric Boat, residents of Southeastern Connecticut do not benefit directly from this service.

6. Weekend Recreation Bus Service. Some scheduled

and chartered buses are operated by the Savin Bus Lines in the region for sightseeing and to visit recreational attractions during the summer months.

B. GENERAL NEED FOR BUS TRANSIT SYSTEM IMPROVEMENTS

The existing bus transit system is inadequate, inefficient and not coordinated with other modes or within the mode itself. There is a need for a systems approach to all bus transit in the region to make it adequate, economic, efficient and reflecting the needs of the communities of the region as a whole. More than two million dollars is being spent annually by the region's towns just for school bus operations. The residents of this region can no longer afford the luxury of independent bus systems for different purposes, such as school transportation, elderly transit, local public bus transit. These are inefficient uses of the public funds and indicate a real need for careful planning for all future transit needs.

C. THE TRANSIT DEVELOPMENT PROGRAM

With these ideas in mind, in 1974 SCRPA began a study of regional transit needs [A TRANSIT DEVELOPMENT PROGRAM FOR THE SOUTHEASTERN CONNECTICUT REGION. Prepared for SCRPA by Urban Transportation Systems Associates, Inc., September, 1975.] aimed at further defining the need and recommending a specific course of action to provide a transit system to serve the varied requirements of the region. The study was financed by the Urban Mass Transportation Administration of the federal Department of Transportation, the Connecticut Department of Transportation and SCRPA. Urban Transportation Systems Associates of Newton, Massachusetts, conducted the study, with advisory assistance from a citizens' committee consisting of representatives from local organizations interested in mass transit services.

The study included a detailed investigation of the present bus system operating in the region, including an analysis of the level and quality of service provided and the ridership response to the existing system. Surveys were conducted to develop existing and potential travel patterns of present bus riders and residents of the region in general. Also, extensive evaluation was made of social and economic conditions to develop a plan for improved transit operations that would be successful in meeting transportation needs. In developing the Transit Development Program (TDP), care was taken to recommend a system which would be realistic and capable of being implemented. (Copies of the TDP are on file with municipal clerks and in libraries throughout the region, as well as in the SCRPA office.)

Although specific improvements are recommended in the TDP, it is nevertheless flexible. Each town, through its representatives to a regional transit district, will have the final say as to the level of service to be provided within its borders, and thus the amount of funding it will provide. The Transit District will continually monitor all phases of the system and will make modifications as deemed necessary. Annually, the TDP will be updated to evaluate the overall effectiveness of the transit system and to make recommendations for needed improvements.

The regional Transit District was formally organized on December 4, 1975, after the legislative bodies of five municipalities voted to form the District. On that date the District Board of Directors voted to proceed immediately with the preparation of an application to the federal Urban Mass Transportation Administration for funding of the first-year program as recommended in the TDP.

1. Recommended Improvements. The improvements recommended in the TDP are designed to increase the quantity and quality of public transportation services in the region. Such an improved transit system will offer residents of the region increased access to employment, recreational, cultural, social, medical and retail activities.

The proposed system will consist of a number of buses operating in a coordinated manner in nine of the region's towns. The system will have two major components: a primary system of fixed bus routes operating on fixed schedules and a secondary system which will provide essential feeder services. The recommended primary system will provide extensive service within the urban cities and will connect the suburban towns with the urban centers. Secondary systems will consist of either demand-responsive service or fixed-route service. In either the demand-responsive or fixed-route services, the secondary service will be generally limited to within a given town and will supplement the primary service within the town. Service routes are shown on Figure 60.

The following are the general provisions of the recommended service improvements:

- All primary routes will interchange at central (terminal) points in New London and Norwich, on the hour and the half-hour. Most routes will have 30-minute frequencies.
- The base fare for fixed route service will be 25 cents. The base fare for demand-responsive service will be 40 cents.
- During off-peak periods, elderly and handicapped persons will pay only one-half the regular fare.
- A free transfer policy will be established which will allow patrons to transfer from one route to another or from the demand-responsive system to the fixed-route system at no additional charge.
- The primary system will operate between 6:00 a.m. and 8:00 p.m. on Monday through Friday and half this level of service on Saturdays (i.e., either fewer runs or fewer hours).

The TDP recommends that New London and Norwich receive improved transit service in year one of the program. East Lyme, Groton, Ledyard, Montville, Preston and Waterford will have improved transit service in year two, and Stonington will have improved service in year four. The towns of East Lyme, Groton, Ledyard, Norwich and Preston will have both primary and secondary service.

The recommended imrpovements also include provision for new signs, shelters, benches, and an extensive marketing campaign designed to encourage transit patronage.

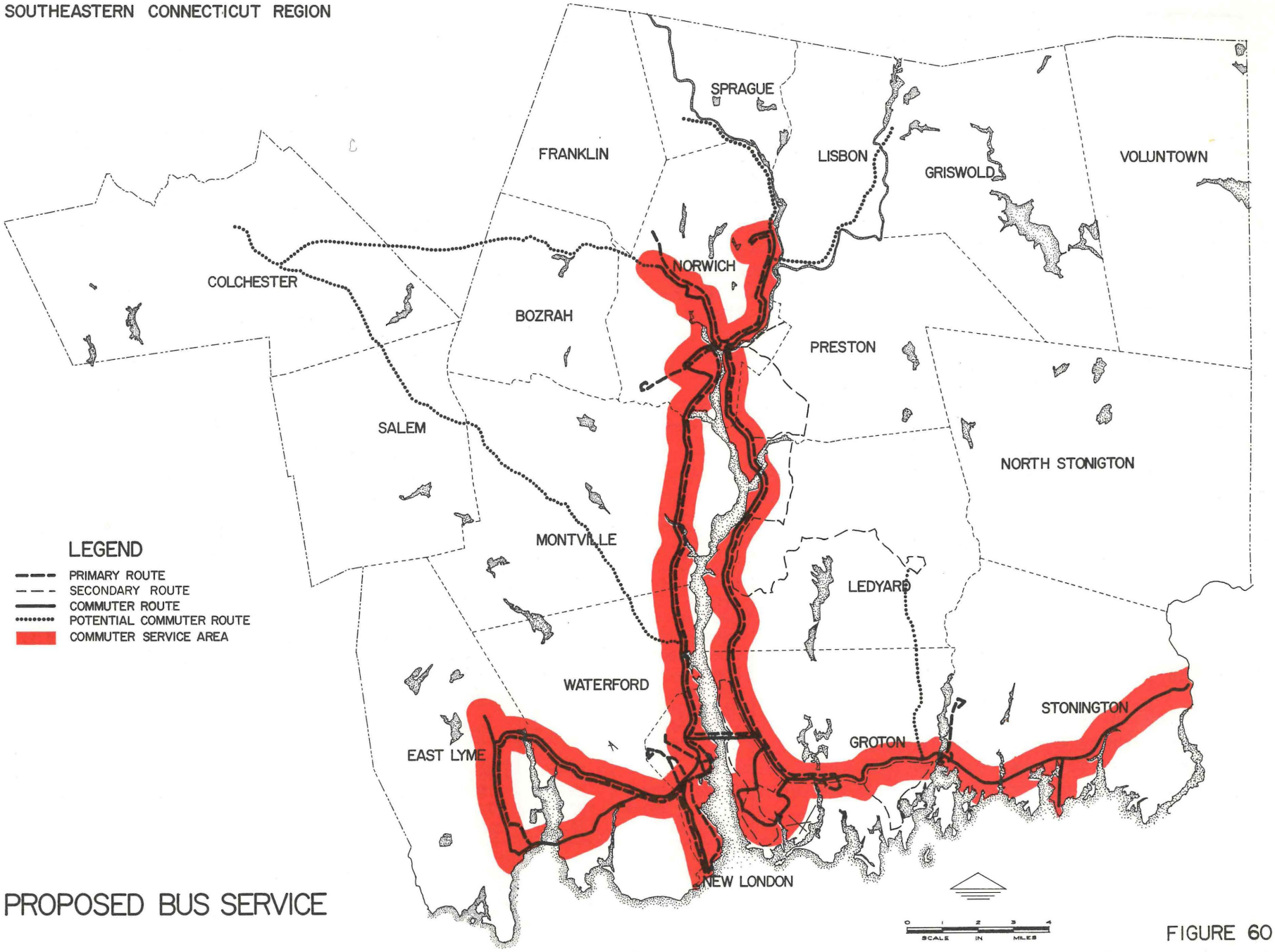
On-street transfer stations are recommended in New London and Norwich during the first year of operation, pending a more detailed architectural and engineering study for terminal structures.

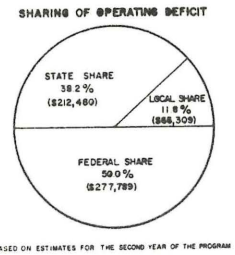
The Plan recommends a feasibility study to determine the type and location of storage/maintenance facilities. This study is being conducted by the SCRPA staff.

Although specific transit recommendations are made in the TDP which directly affect only nine of the eighteen towns of the region, transit service should eventually be provided to each town within the region. An analysis of operational costs and ridership associated with the provision of service to the rural communities indicated that these communities would not be willing to support the cost of service at this time.

2. Financing. The revenue generated by the transit system will not be adequate to cover the operating costs associated with providing the improved transit service. However, with continued improvements to the transit system resulting in increased transit patronage, future deficits are expected to be reduced.

Due to state and federal funding policies for mass transportation, member towns of the transit district will be responsible for only a small portion of the


SOUTHEASTERN CONNECTICUT REGION
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
NORWICH
COLCHESTER
BOZRAH
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
WATERFORD
STONINGTON
GROTON
EAST LYME
NEW LONDON
LEGEND
PRIMARY ROUTE
SECONDARY ROUTE
COMMUTER ROUTE
POTENTIAL COMMUTER ROUTE
COMMUTER SERVICE AREA
SCALE IN MILES
PROPOSED BUS SERVICE
FIGURE 60
SCRPA 1975



operating deficits. The pie graph illustrates the projected state, federal and local sharing of the operating deficit of the transit system.

Based on the recommended levels of service, estimates of operating costs and anticipated ridership and on present state and federal funding policies, estimates were developed to indicate the costs (share of operating deficit) that each member municipality of the transit district would be responsible for paying. Table 45 indicates the estimated yearly distribution of these costs.

All capital equipment expenses associated with the improved transit service, such as the purchase of new buses, radio equipment, passenger shelters, bus stop signs, garages, etc., are expected to be paid for entirely by the State and Federal Governments. The cost of the capital equipment over the five-year period is estimated to be $1,216,200. Again, this cost would involve only State and Federal funds.

D. OTHER BUS TRANSIT IMPROVEMENT NEEDS

In addition to the local and intermunicipal bus service proposed in the TDP, there are other more specialized bus service needs which should be provided for. Some of these were addressed briefly in the TDP.

1. Commuter Buses. From 22 to 27% of all auto trips in the region are made for the purpose of going to work. The average trip length in 1970 was 8.4 miles. With the rising cost of automobiles, repairs, maintenance, insurance and gasoline, the ride to work in the private automobile is becoming increasingly expensive. These trips are undertaken every day of the week and on a fixed schedule and therefore could very well be undertaken by bus, especially in urbanized areas, which produce the bulk of the trips. The commuter bus offers the average worker a ride to work at substantially lower cost and with more comfort than the automobile at times of peak traffic congestion. The following commuter bus service is recommended between the communities of Southeastern Connecticut.

Norwich-New London-Groton. Commuter express bus service should be provided on Route 32 from 6:30 a.m. to 9 a.m. and 3:30 p.m. to 6 p.m., serving the resi-

TABLE 45

ESTIMATED DISTRIBUTION OF TRANSIT DISTRICT FUNDING
(1975 Dollars)

Town	Year One*	Year Two#	Year Three#	Year Four#	Year Five#	5-Year Total
East Lyme	-	$ 14,588	$ 13,650	$ 12,883	$ 11,958	$ 53,079
Groton	-	12,430	11,285	10,501	9,355	43,571
Ledyard	-	7,213	6,771	6,461	6,019	26,464
Montville	-	3,601	3,532	3,585	3,503	14,221
New London	$ 7,052	5,888	4,177	3,315	3,108	23,540
Norwich	10,033	12,187	10,696	10,042	8,565	51,523
Preston	-	3,799	3,550	3,336	3,074	13,759
Stonington	-	-	-	1,795	1,657	3,452
Waterford	-	5,603	5,299	5,248	4,931	21,081
Total Local Share:	$ 17,085	$ 65,309	$ 58,960	$ 57,166	$ 52,170	$ 250,690
State Share	85,531	212,480	206,795	213,392	209,060	927,258
Federal Share	102,617	277,789	265,756	270,557	261,229	1,177,948
Rider Fares	137,007	280,470	304,537	333,573	352,229	1,407,816
Total Funds Needed:	$342,240	$836,048	$836,048	$874,688	$874,688	$3,763,712

* Does not include administrative costs.
\# Assumes state and federal participation in all operating expenses, including administrative costs.

dents of Uncasville in Montville, Quaker Hill in Waterford, and New London who work in New London and Groton (see Figure 60). The average trip time to work for the residents in this area should be around 25 minutes. The headway [The headway is the time interval between buses.] during the peak period should vary from 5 to 10 minutes. Headway and timings should be adjusted according to the specific needs of the riders.

Norwich-Groton-New London. A commuter express bus service should be provided on Route 12 from 6:30 a.m. to 9 a.m. and from 3:30 p.m. to 6 p.m. serving the residents of Ledyard, Preston, and Groton who work in Groton and New London. The average time for the trip on this route should be 25 to 30 minutes. The headways during the peak period should be from 5 to 10 minutes.

Pawcatuck-Stonington-Mystic-Groton. Similar commuter express bus service should be provided on Route 1 from 6:30 a.m. to 9 a.m. and from 3:30 p.m. to 6 p.m. serving residents in Pawcatuck, the Borough of Stonington, and Mystic who work in Groton. The headways for this service should be determined by the level of commuter ridership.

East Lyme-Waterford-New London-Groton. Commuter express bus service should be provided on Route 1A and Route 156 serving the residents of East Lyme, Waterford and New London who work in Groton. The headway could vary 5 to 15 minutes to meet the changing demands during peak periods.

As the region's work force becomes more accustomed to commuting by public transit, several additional intra-regional commuter routes should be explored. Potential routes deserving future evaluation include ones which would connect Colchester, Baltic, Jewett City and Ledyard Center with the system serving the region's development core. These potential routes are also shown on Figure 60.

Commuter buses are also recommended for routes connecting this region to points elsewhere in Connecticut and Rhode Island. These recommendations are based on work trip data shown on Figure 61. The proposed commuter routes are shown on Figure 62.

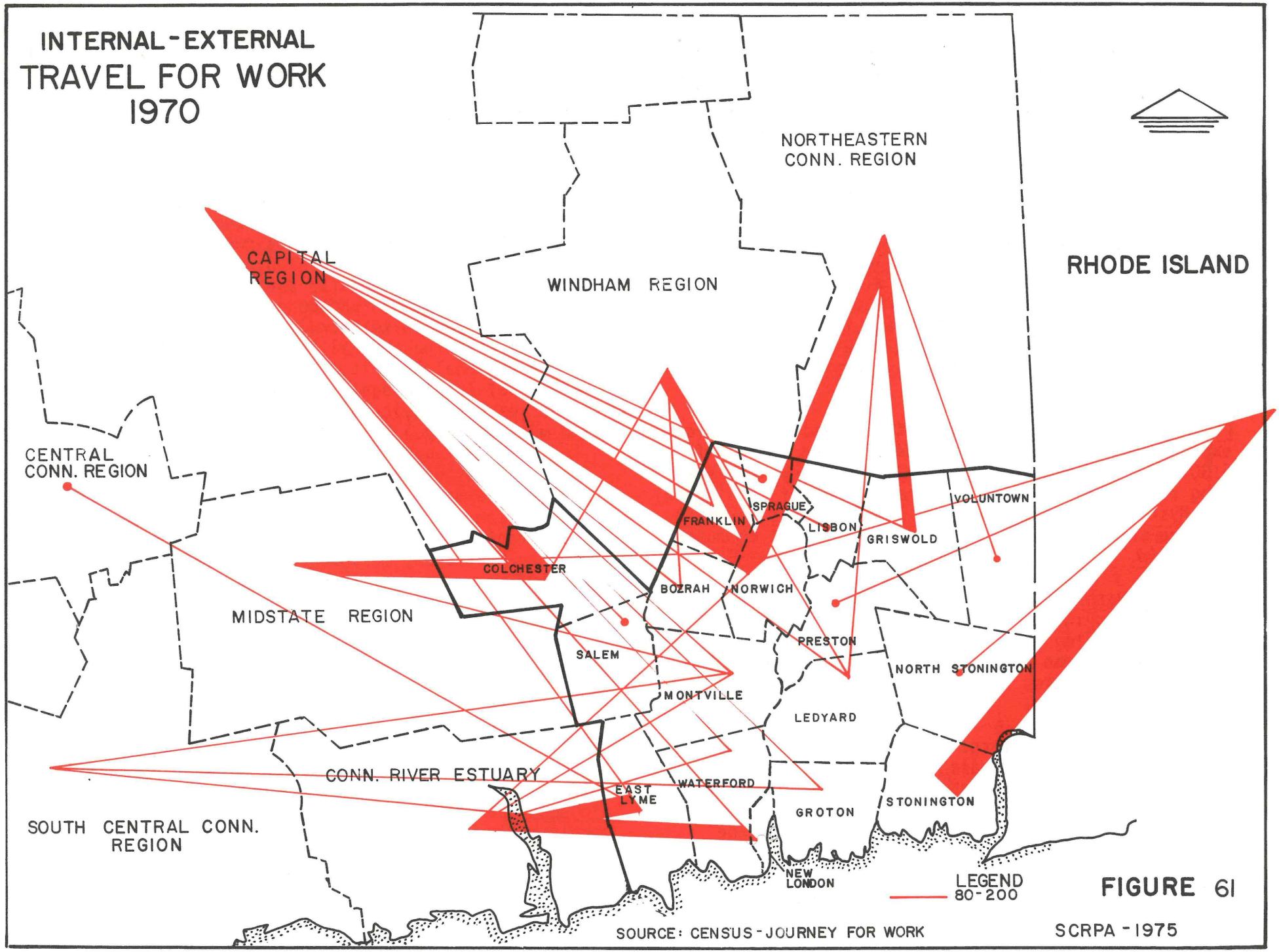
2. Elderly and Handicapped. Special bus service is needed to serve the elderly and handicapped citizens of the region. Major accomplishments have already been made through the Area Agency on Aging (AAA), which has provided seven of the region's municipalities with capital equipment and operating funds to get busing programs started for these elements of the population. As such funding declines there will be an increasing need to coordinate the planning of such services with the general bus service to be provided by the Regional Transit District. (Generally, AAA funding of local elderly bus service ends after the third year of service and all costs must be borne by the municipality.)

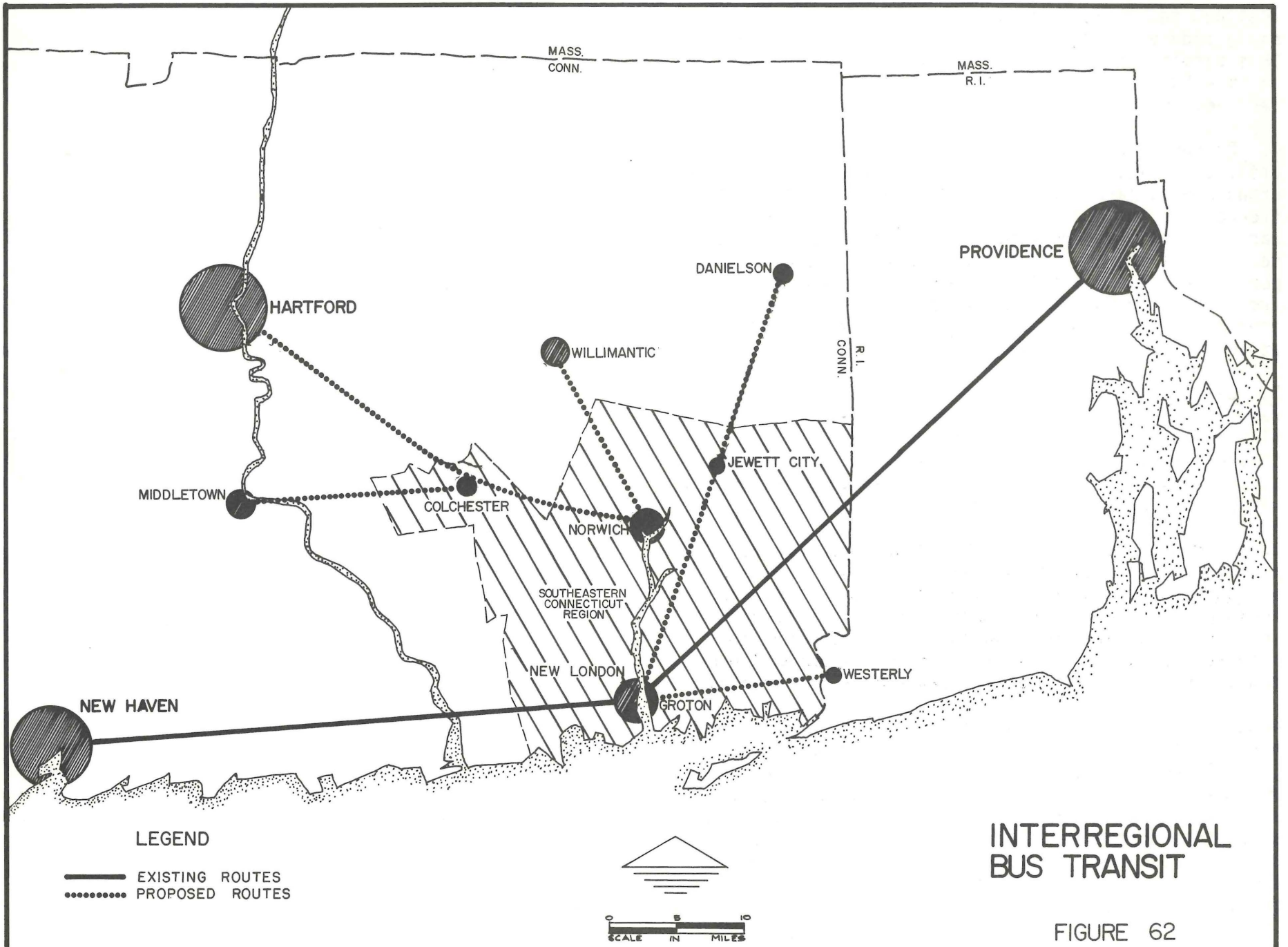
In some areas of the region, increased regular public bus service may eliminate the need for special elderly bus service. In others, the regular service may be supplemented by demand-responsive ("dial-a-ride") service to meet these more specialized needs.

3. School Busing. The TDP discusses in detail the problems associated with using school buses for regular transit purposes. The following recommendations are summarized from the TDP (page 99):

"School buses should not be considered for public transit service. Any saving of capital cost, which is no saving to local communities, is not a saving to any public agency because the vehicle being used for two purposes will accumulate the miles and wear of two buses, therefore requiring replacement sooner. The only saving is in terms of the depreciation of the vehicle over time which is minimal, compared to the total cost of providing transportation service either to school children or to the public.

"When possible, regular local bus service should be


INTERNAL-EXTERNAL
TRAVEL FOR WORK
1970
NORTHEASTERN
CONN. REGION
RHODE ISLAND
CAPITAL
REGION
WINDHAM REGION
CENTRAL
CONN. REGION
SPRAGUE
FRANKLIN
LISBON
GRISWOLD
VOLUNTOWN
COLCHESTER
BOZRAH
NORWICH
MIDSTATE REGION
PRESTON
SALEM
NORTH STONINGTON
MONTVILLE
LEDYARD
CONN. RIVER ESTUARY
WATERFORD
EAST
LYME
GROTON
STONINGTON
SOUTH CENTRAL CONN.
REGION
NEW
LONDON
LEGEND
80-200
FIGURE 61
SOURCE: CENSUS-JOURNEY FOR WORK
SCRPA-1975



INTERREGIONAL BUS TRANSIT

FIGURE 62

designed to provide service to public schools to possibly reduce the costs of providing school bus service. This service should not be construed as school bus service but rather public service which can be effectively used by students."

4. Preferential Highway Lanes. To encourage the more efficient utilization of limited highway facilities in urban areas, lanes have been reserved on several major freeways in the United States for the exclusive use of car pool vehicles and buses. This preferential treatment is, of course, desirable in situations where car pooling and bus transit is enough to warrant such treatment. In Southeastern Connecticut, however, limited arterial widths make such action appear infeasible, at least for the foreseeable future.

5. Car Pooling. Car pooling is an effective means of reducing the number of vehicles on the streets and highways during peak traffic hours. It offers the same net advantages as busing, although on a different scale. Traffic congestion, parking space requirements, air pollution and energy consumption are all reduced.

In the recent years CONNDOT has taken a bold step in promoting and facilitating car pooling in the State of Connecticut. SCRPA provided help to CONNDOT for commuter car pool matching services for this region in 1974. The car pooling program will continue to play an important role in reducing environmental problems, especially where public transit is not feasible.

Numerous commuter parking lots have been constructed throughout the region for the use of car poolers. (See Figure 56 in Chapter VIII.) Many of these lots also may be used for "park and ride" bus services. Under this arrangement, the commuter parks his vehicle at an interchange or other fringe-area lot and boards a bus for the remainder of his trip to work. This system has been highly successful in many areas of the country and should be instituted here as well.

Rail passenger and freight service is a significant element in the region's transportation system. Historically, it has played a vital role in the physical and economic development of this region. However, after World War II the rise in commercial aviation, and the construction of extensive expressway systems, the accompanying rise in automobile ownership, and competition from trucks resulted in a steady decline in rail passenger and freight traffic. The tremendous growth of competition plunged many railroads into bankruptcy.

A. RAIL REORGANIZATION

Responding to this problem, Congress enacted the Regional Rail Reorganization Act of 1973 (Public Law 93-236) in order to permit the bankrupt carriers to reorganize. This Act provides for the establishment of the Rail Services Planning Office (RSPO) within the Interstate Commerce Commission (ICC), the United States Railway Association (USRA), and the Consolidated Rail Corporation (CONRAIL). The USRA was chartered to prepare a Preliminary System Plan (PSP) and a Final System Plan (FSP) and to arrange for financing the start-up costs of CONRAIL, which will acquire, modernize and maintain the rail systems of the bankrupt companies. Hearings on the USRA system plans were held by RSPO, whose responsibility it is to represent the public view. In addition to operating and maintaining the system, CONRAIL will provide commuter service to certain areas and will make arrangements with AMTRAK to provide long-haul passenger service within the system.

The 1973 Act also requires that each affected state submit a state rail plan in order to be eligible for federal subsidy assistance. Consequently, the Connecticut Department of Transportation selected a consortium of consultants to assist the department in certain aspects of the state rail plan. As a result, a Connecticut State Rail Plan has been prepared by CONNDOT with assistance from the NUS Corporation, Gellman Research Associates, Inc., and Rail Tech and Associates. The plan, as approved by the Federal Railroad Administration, was published in December, 1975.

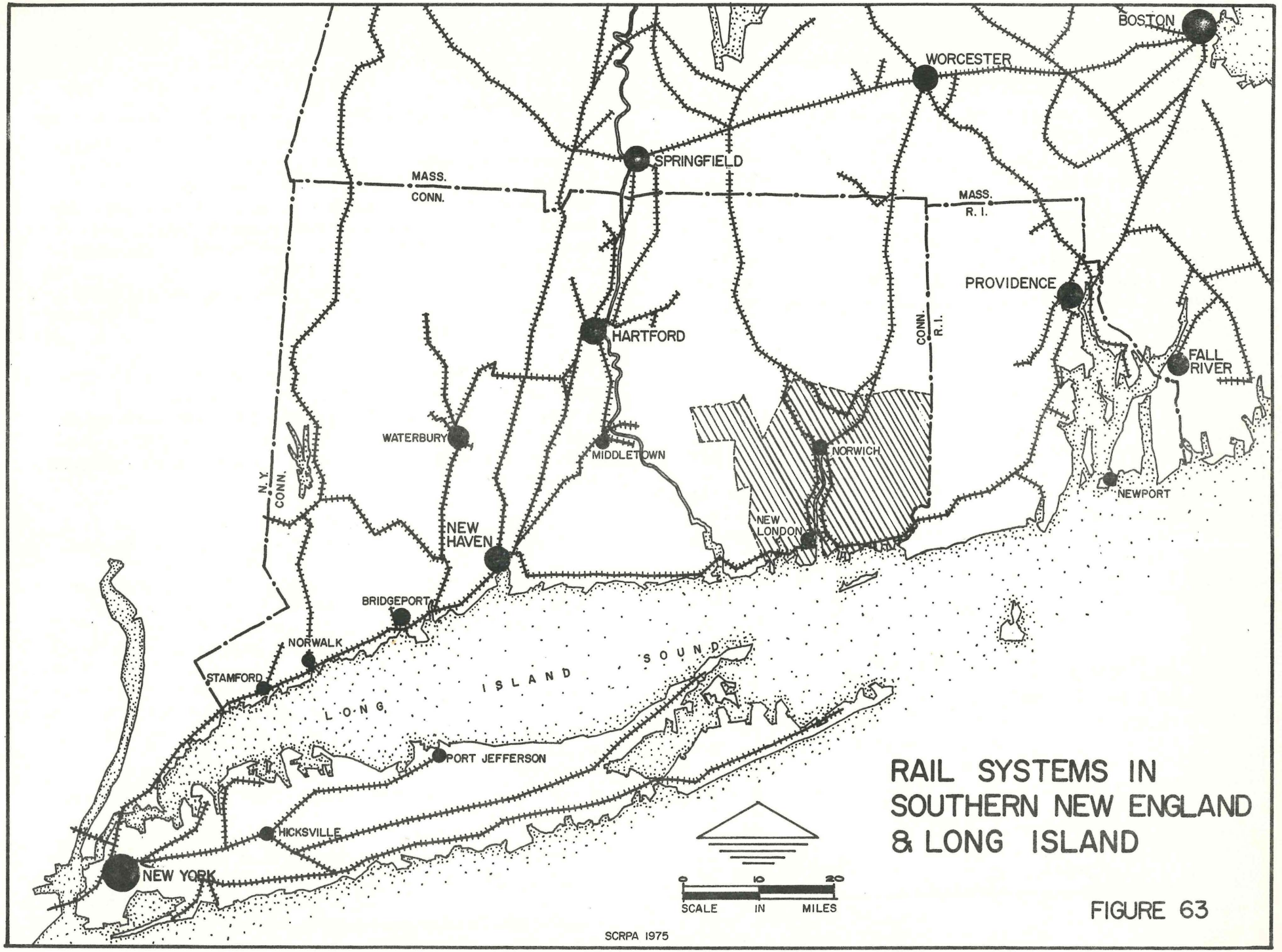
B. EXISTING SERVICE

The Southeastern Connecticut Region has a rail network which adequately connects the region's major production and distribution centers with each other and with interstate main line freight routes. The region is presently served by 4 rail lines. (Figure 63.)

1. Shore Line. The Shore Line in this region is a part of the Northeast Rail Corridor from Washington to Boston. This double track line passes through East Lyme, Waterford, New London, Groton, and Stonington. This line has been included in the final rail plan with CONRAIL trackage rights, for local freight through service between Boston and New York.

The passenger service is provided by AMTRACK on this line as a part of passenger service between Washington and Boston with all stops in New London and some in Mystic.

2. Norwich Secondary Track. This line extends from Groton (where it connects with the Shore Line) to Worcester, Massachusetts, where it connects with the interstate line between Boston and Albany. A part of this line (USRA #678a) from Putnam, in the Northeastern Connecticut Region, to Worcester, Massachusetts, has not been included in the final CONRAIL



RAIL SYSTEMS IN SOUTHERN NEW ENGLAND & LONG ISLAND

FIGURE 63

plan. At present, local service is provided on this line for freight only between New London, Norwich, Plainfield, Putnam and Worcester.

3. Planfield Secondary Track. (USRA #674) This track extends from Plainfield, Connecticut, where it connects with the Norwich secondary track, to Willimantic, Connecticut, where it connects with the Central Vermont Railway. It passes through the Southeastern Connecticut Region. The portion of this track from Versailles, Town of Sprague (milepost 9.8), to Willimantic (milepost 23.1), has been excluded from the final CONRAIL plan. This line is served by a local freight out of Plainfield. [RAIL SERVICE IN EASTERN CONNECTICUT. Eastern Connecticut Development Council, Inc., 1975.]

4. Central Vermont Railway. This CVR track extends from New London, Connecticut, where it connects with the Shore Line, to Palmer, Massachusetts, where it connects with the interstate line between Boston and Albany. The Central Vermont Railway is not a part of the rail reorganization. The switching between the CVR and Penn Central now in this region takes place in New London.

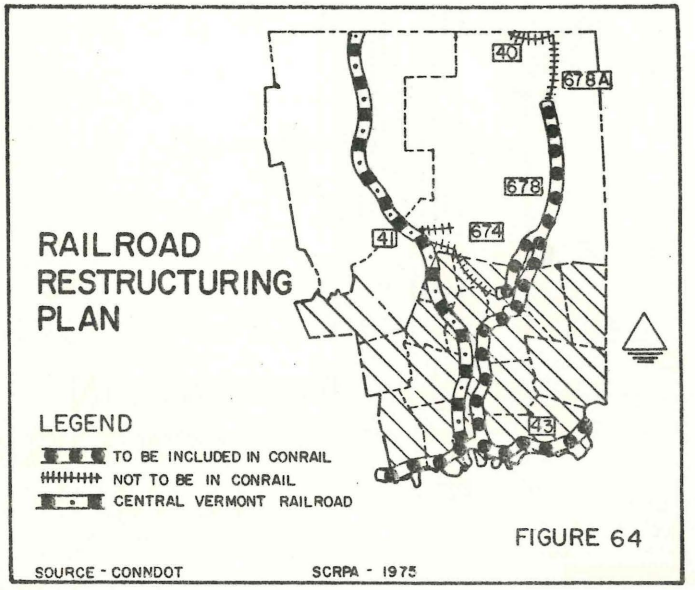


FIGURE 64

C. SURVEY OF RAIL FREIGHT SERVICE

A rail freight user survey was conducted by the Eastern Connecticut Development Council in January-February, 1975. The results of this survey demonstrated that Eastern Connecticut is a substantial and rapidly growing rail market. The present and potential rail freight volume generated in Eastern Connecticut justifies not only the continuance of current service but also the improvement of that service. [RAIL SERVICE IN EASTERN CONNECTICUT. ECDC, 1975.]

Figure 65 indicates the rail freight volume in 1974 in Eastern Connecticut. Table 46 summarizes data on rail freight shipments by line located in Southeastern Connecticut.

TABLE 46

SUMMARY OF RAIL FREIGHT SURVEY
FOR SOUTHEASTERN CONNECTICUT FIRMS

Rail Line	# Firms at Line: Total	# Firms at Line: Data Received For	Tons Shipped & Received: 1973	Tons Shipped & Received: 1974	Rail Shipping Charges (thousand $): 1973	Rail Shipping Charges (thousand $): 1974	Volume Increase 1973-74	Volume Increase Service Improved
Shore Line	14	13	375,829	379,645	3,758.0	4,607.9	+1.0%	10,778
Norwich Secondary Track	8	7	71,849	92,012	1,106.5	1,466.3	+28.1%	25,158
Plainfield Secondary Track	3	3	34,900	67,293	716.7	1,227.0	+92.8%	7,200
Central Vermont Railway	21	20	269,541	317,710	4,361.9	4,682.7	+17.9%	152,428
TOTAL	46	43	752,119	856,660	9,943.1	11,983.9	13.8%	195,564

Source: Eastern Connecticut Development Council.

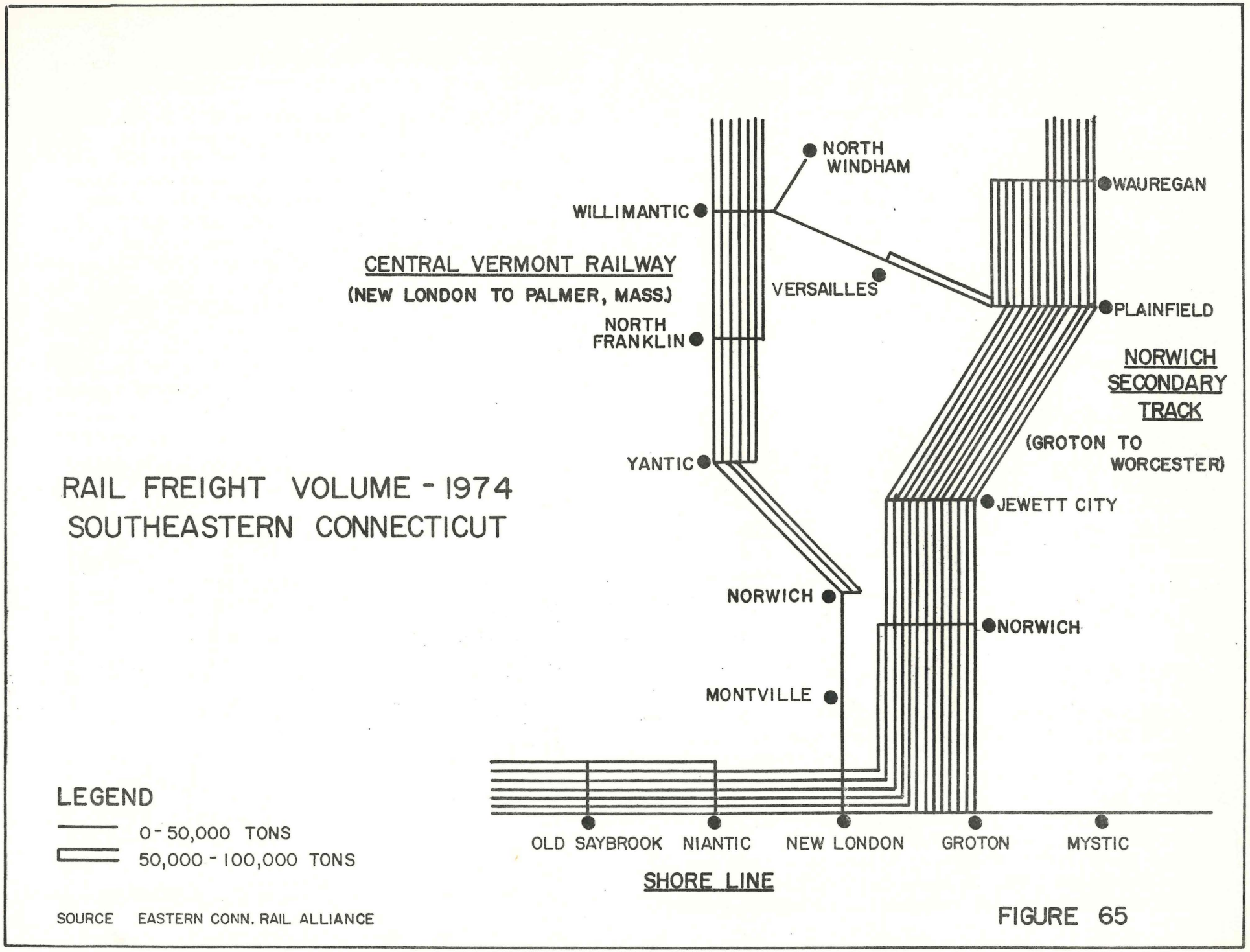

RAIL FREIGHT VOLUME - 1974
SOUTHEASTERN CONNECTICUT
CENTRAL VERMONT RAILWAY
(NEW LONDON TO PALMER, MASS.)
NORTH WINDHAM
WILLIMANTIC
VERSAILLES
WAUREGAN
PLAINFIELD
NORTH FRANKLIN
NORWICH SECONDARY TRACK
(GROTON TO WORCESTER)
YANTIC
JEWETT CITY
NORWICH
NORWICH
MONTVILLE
OLD SAYBROOK
NIANTIC
NEW LONDON
GROTON
MYSTIC
SHORE LINE
LEGEND
0 - 50,000 TONS
50,000 - 100,000 TONS
SOURCE EASTERN CONN. RAIL ALLIANCE

FIGURE 65

D. IMPACT OF USRA'S FINAL SYSTEM PLAN RECOMMENDATIONS

USRA has adopted a position that freight and passenger trains cannot co-exist on the Northeastern rail corridor if passenger service goals are to be achieved. Its recommendation to minimize freight traffic on the Shore Line would result in very poor service to the industries and farm producers of Southeastern Connecticut. The recommendation to abandon lines between Putnam and Worcester and Willimantic to Versailles and the intention of eventually seeking elimination of freight service on the Shore Line would mean no rail freight service to Southeastern Connecticut except on the Central Vermont Railroad. The economic and environmental repercussions of this action will be very severe for this region.

USRA #674. (Plainfield-Willimantic.) A portion of this line (from Versailles to Willimantic) has been excluded from the Final System Plan. The only existing firm in this region which will lose rail service is a grain mill located in Baltic. The firm ships and receives 1,500 tons of goods and pays $27,000 in shipping charges annually. The State Rail Plan and the study done by ECDC have calculated the socio-economic and environmental impacts due to abandonment of this track. A state subsidation of the track has been recommended by the State Plan.

E. PASSENGER SERVICE

1. Existing Service. Presently, AMTRAK provides daily rail passenger service between Boston and New York on its mainline route along the coast through Southeastern Connecticut. Scheduled stops are made at stations located in New London and Mystic. This is the only rail passenger service provided within the region. The Connecticut Department of Transportation is considering the restoration of passenger service on the New London-Worcester Line. A survey was conducted by CONNDOT to determine the feasibility of such action. To date, a report on the survey has not been published.

There is no survey or data that exists on the characteristics of existing rail passenger travel. However, personel observations indicate that the rail users passing through or originating at New London are basically younger people, especially college students and Navy personnel. The total number of persons using the New London railroad station in 1974 was 233,631. Figure 66 indicates monthly variations in passenger traffic at New London. It is obvious from this figure that more persons use this mode of transportation during summer months. According to the 1974 AMTRAK Annual Report, the New London Railroad Station ranks 20th among the approximately 200 stations it serves, in terms of passenger usage.

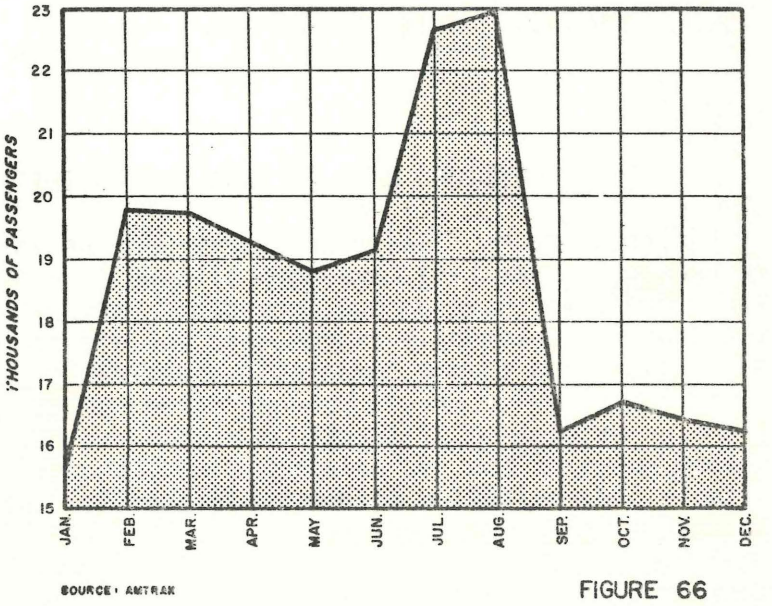


FIGURE 66

2. Commuter Service. There is no commuter rail service in the region at the present time. However, traffic desire lines indicate that there is a tremendous amount of work traffic in the very same corridors (along the coast and along both sides of the Thames River) where the main rail lines presently exist. Traffic projections and development pattern forecasts for 1990 indicate the traffic volumes on the existing corridors will grow steadily. Travel projections show a 47% increase in overall automobile traffic under prevailing conditions.

Fortunately, both the major employment centers of the region and the greatest portion of the region's population live in close proximity to the principal rail lines. The limited present use of some of the rail lines, especially along the east bank of the Thames River, suggests a possible future use of these facilities for rail or rail-bus commuter service. It is therefore recommended that greater study be made of the feasibility of commuter rail service for this region. Included in such a study should be an evaluation of reinstituting the Budd Car service from the New London-Groton area northward to points north of the region.

F. PHYSICAL CONDITIONS OF EQUIPMENT AND FACILITIES

1. Railroad Tracks. Railroad tracks upon which trains are presently operating have been allowed to deteriorate. Americans have become accustomed to very high standards for automobile expressways and air travel, and nothing less than a comparable standard for passenger rail service should be considered acceptable. If the deterioration of tracks is allowed to go unchecked, much of the region's track will become unsuitable, necessitating either replacement or abandonment.

Along with repair of the tracks, there is a great need for improving rail crossings. Many crossings could be made smoother for automobile traffic. Others require grade separations.

2. Railroad Stations. All of the region's railroad stations have either been abandoned or allowed to fall into a dilapidated condition. Fortunately, the most important station in the region, New London's Union Station, is being rehabilitated. If greater rail passenger use is to be encouraged in the future, the passenger waiting facilities will have to be modernized and properly maintained. Station improvement needs should be addressed in any feasibility study concerned with commuter service for the region.

G. HIGH-SPEED RAIL SERVICE

A new high-speed rail corridor between Boston and New York has been studied in the past. Such a line would very likely pass through Southeastern Connecticut and would probably have a significant environmental, social and economic impact on the region. The feasibility of a high-speed rail line was studied in 1969 by Systems Analysis Research Corporation and Thomas K. Dyer, Inc., for the New England Regional Commission. The study concluded that a high speed line was desirable and feasible and recommended a process of implementation.

At this point in time interest in the high-speed corridor has waned and consideration has shifted to improving the existing shore line route to accommodate faster-moving trains. SCRPA feels that the financial requirements of a new corridor make the project highly questionable in the foreseeable future. Efforts should continue to be aimed at improving the condition and service capabilities of the existing rail lines.

A. EXISTING FACILITIES

1. New London Harbor. New London Harbor is the most favorable natural harbor on the Connecticut coast. Its location at the eastern end of Long Island Sound provides direct access to the major trans-Atlantic and coastal sea lanes. The entrance to the harbor is perfectly straight, unusually short, with deep-water access directly to the Thames River channel. The River is free-flowing and non-sedimenting. This self-cleansing capability eliminates the need for frequent maintenance dredging of sedimentary build-up. [NEW CONCEPTS IN SEAPORTS. Connecticut Research Commission, 1970.]

New London's harbor entry channel has recently been dredged to a depth of 36 feet and is 500 feet wide. It is approximately 3.5 miles in length. The channel and main harbor essentially ends at the State Pier and railroad bridge. The channel continues beyond this point up to Norwich, but at progressively shallower depths. Between the State Pier and the Naval Submarine Base, it is 33 feet deep. North of the Sub Base the channel is only 24 feet and then drops to 19 feet. North of the Dow Chemical Company plant, traffic is limited primarily to pleasure craft, barges and small coastal vessels.

Various activities on both sides of the Thames River have private docking facilities for freight shipping and receiving. On the east side of the river major activities are the Charles Pfizer Company, Electric Boat, Hess Oil, the U.S. Submarine Base, and the Dow Chemical Company. On the west side of the river, major facilities include the State Pier, New London City Pier, U.S. Coast Guard Academy, Dahl Oil Company, and the Connecticut Light and Power Company generating plant. These activities are major users

TABLE 47

NEW LONDON HARBOR DATA

Main Channel Depth/Width	36' x 500'
Tidal Range	6'
Tonnage 1971	3.88 Million
Commodities	Petroleum Lumber Textiles Molasses Chemicals
Market Area	Connecticut W. Massachusetts S. Vermont
Trends	Increased Petroleum Traffic
Limiting Factors	Channel Depth
Facilities	4 Oil Terminals 2 Other
Environmental Problems	Spoil Disposal

Source: Long Island Sound Study.

of the Thames River for marine transportation, especially for the receipt of fuel and chemicals.

2. Mystic River and Stonington Harbor. Prior to World War II the Mystic River and Stonington harbor played important roles in the region's waterborne commerce. Now the port and channel facilities are not big enough to handle modern commercial marine traffic. The commercial freight handled at these ports is negligible and their role in the region's waterborne commerce appears over.

3. Ground Transportation. An adequate ground transportation system is a vital factor in the development of port facilities. Southeastern Connecticut is well served by rail and highways. The rail facilities on either side of the Thames River and on the State Pier, plus I-95 and Route 52 would help in the potential industrial development of the region. As shown on Figure 67, both rail and highway facilities abound in close proximity to the New London Harbor. The interconnection of these modes enhances the economic development potential of the entire region. An important element in harbor development is vehicle parking space. This has been amply provided by the City of New London in the vicinity of the ferry terminal, the city pier, and the railroad station.

B. CARGO

1. Trends in Waterborne Commerce. Table 48 indicates the amount of cargo handled at New London Harbor and other Thames River port facilities in recent years. Marine transportation of goods to this region has been increasing steadily throughout this century. Figure 68 indicates how this has affected the individual port areas of the region. The sharp increases at New London and other Thames River port facilities has greatly offset drastic declines in marine commerce in the Stonington and Mystic River ports. The increases in waterborne commerce in New London and the Thames River are due principally to sharp increases in the imports of petroleum products. According to the Long Island Sound Study, petroleum receipts in 1971 in New London and other Thames River ports totaled 9 million barrels. This is expected to increase to 13.2 million barrels by 1990.

2. Need For Facility Improvement. The continuous increase in the demand for handling millions of barrels of residual oil is the major problem facing New London Harbor. The Long Island Sound Study indicates that 75% of the total residual oil received in New London is transshipped by barge to the Dahl Oil Company in Norwich and to power generating plants in Montville, Middletown and Hartford. The projected large volumes of petroleum and other cargo, coupled with vast increases in vessel traffic, will demand a greater increase in the improvement, expansion and modernization of the port facilities in New London.

TABLE 48

WATERBORNE COMMERCE (SHORT-TONS)
IN SOUTHEASTERN CONNECTICUT REGION

	1961	1971	1973
Liquid Bulk	1,358,905	4,683,735	6,856,578
Dry Bulk	199,657	88,601	0
Break Bulk	41,126	46,690	67,287
GRAND TOTAL:	1,599,688	4,819,026	6,923,865

Source: Data from Connecticut Department of Transportation.

The Long Island Sound Study concluded that energy consumption in the Long Island Sound region shows a continued rate of growth. 40% of the total petroleum products shipped on the Sound are used for generating electric power. The study further concluded that the consumption of electricity triples every 20 years. Since nuclear power currently provides only 8% of the Long Island Sound area's electric power and people have registered strong opposition to nuclear plants, the reliance on petroleum products will increase the import of petroleum into this region's ports.

The Long Island Sound Study anticipated that deepening of the present Thames River channel from the

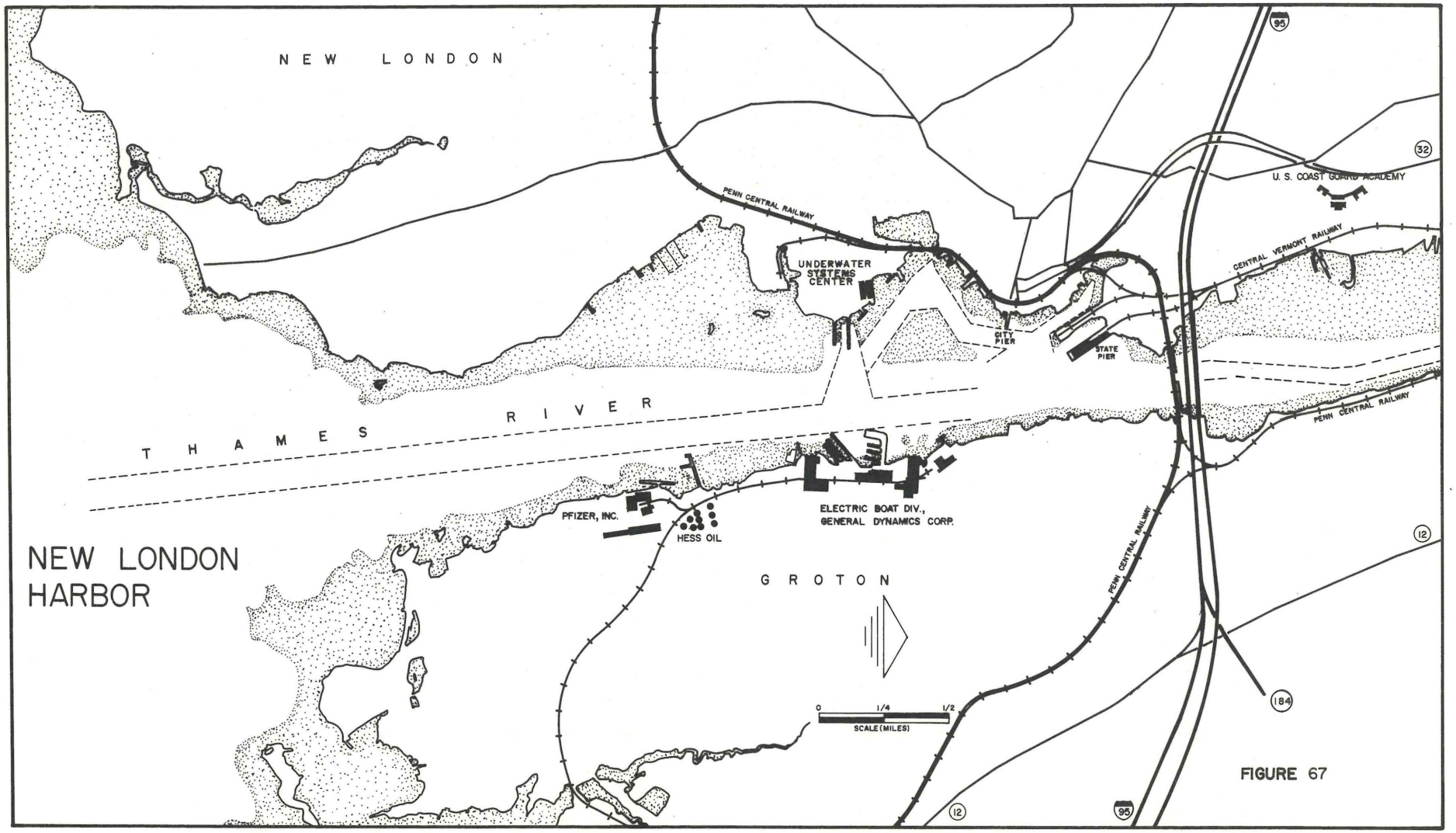
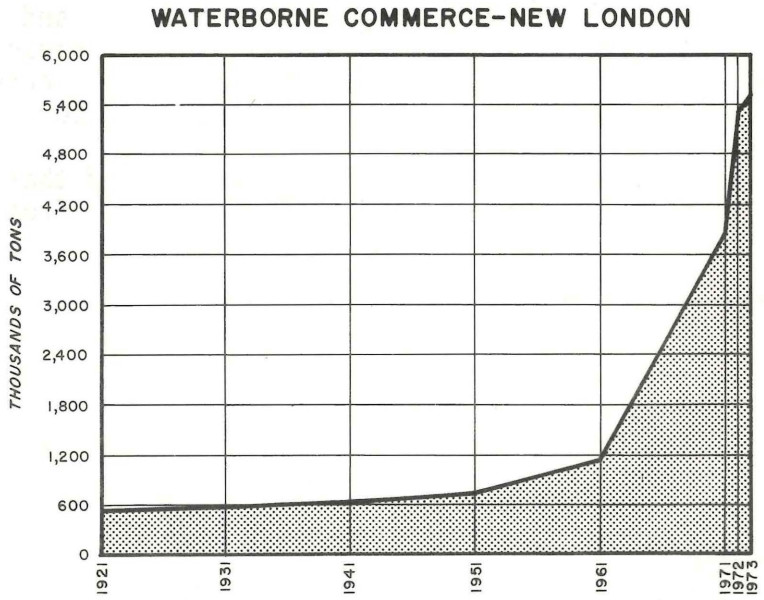
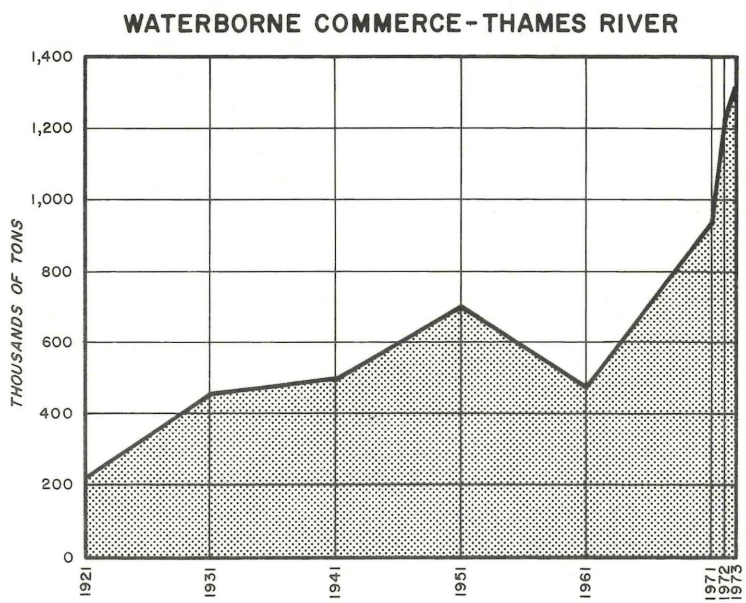
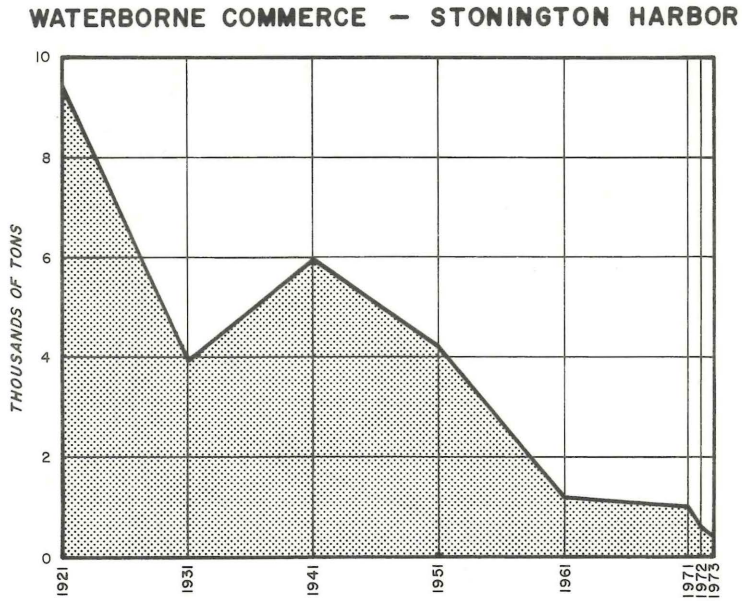
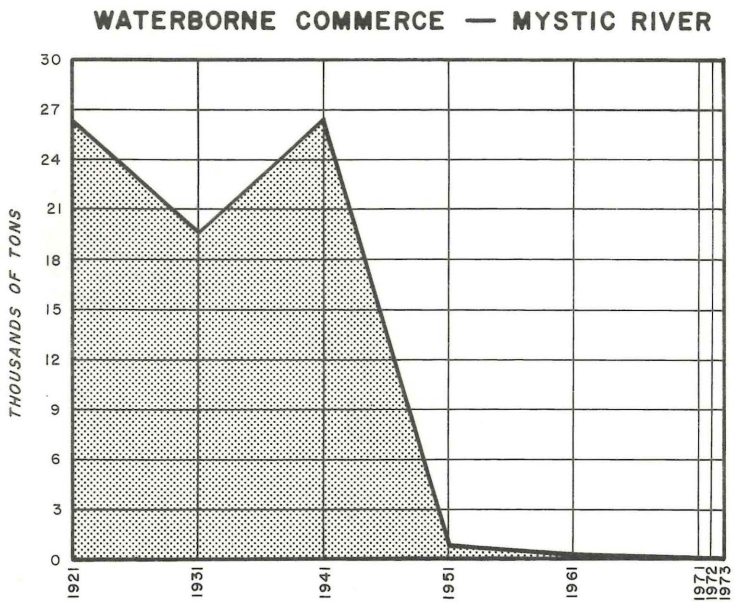


FIGURE 67









Source: Data supplied by CONNDOT.

FIGURE 68

Sound to the Navy Submarine Base from 33 to 36' will be adequate for traffic to 1985, accommodating larger tankers carrying about 40,000 tons and entering the port only three or four times a month. On the Thames River it is expected that barge traffic will continue to be the chief method of product movement, and that may require deepening the present 19' channel in some places north of the Sub Base to Norwich to cope with future traffic. There is also likely to be a demand for an expansion of storage facilities for petroleum products along the riverfront.

The New London State Pier Study, conducted by Frederic R. Harris, Consulting Engineers, has proposed the expansion, upgrading and modernizing of general cargo facilities, but action has not been taken to implement the proposal.

Also under consideration by the Department of the Army is a long-standing Corps of Engineers proposal to deepen the harbor entrance channel to 40 feet and deepen other maneuvering areas in the harbor.

To meet the needs generated by steadily increasing cargo handling in New London, the general provisions of the State Pier Study should be implemented and coordinated with the overall transportation development of the region. The channel improvements made by the Navy should be a major first step toward general harbor improvement.

Barring additional problems, the Navy hopes to continue dredging to straighten the Thames River channel and deepen it to 36 feet between the bridge crossings in New London to the Sub Base. Maintenance dredging of the remainder of the river's channel north of the Sub Base is desirable if there is to be any expanded future use of the waterway for the movement of goods.

C. PASSENGER SERVICE

In most parts of the nation, passenger travel by water has become negligible, but Southeastern Connecticut has considerable marine passenger travel from New London to Long Island, Fishers Island, and Block Island. Existing ferry services transport not only passengers, but automobiles and trucks as well.

1. Existing Ferry Service. New London-Orient Point, Long Island. Existing ferry service is operated by New London Freight Lines, Inc., between New London and Orient Point. It is a private company which is licensed in New York and certified by the ICC. The State of Connecticut has no regulatory authority over its operation. According to a survey conducted by CONNDOT in 1972, existing ferry service was found to be inadequate to meet the summer demand.

In 1975 the line ran seven round-trips daily, with an additional four trips in the summer months. In 1974 the ferry carried 132,640 passengers and 49,000 vehicles. This represented a drop in traffic of 15.5%, due probably to an increase in vehicle fares from $9.50 to $14.00 in 1974.

The Long Island Sound Ferry Study, conducted by the Tri-State Planning Commission and presently in draft form, contains considerable information regarding passenger characteristics.

New London to Fishers Island, New York. This ferry service is provided year-round. Service schedules are increased in number during the summer months to handle recreation traffic. Frequency of service varies from two to five round-trips daily, depending on the time of week and season of the year. At the time of this writing, the operators reported that existing ferries are being replaced by new ferries with greater carrying capacities.

During 1974 the Fishers Island Ferry carried 65,002 passengers, 12,981 automobile and 907 trucks.

New London to Block Island, Rhode Island. This service operates only between June and September to

accommodate tourist and recreation traffic. The ferry has a capacity of 22 vehicles and 700 passengers.

2. Need For Improvement. The greatest need for improvement in ferry service concerns the Orient Point ferries and terminal facilities. The Long Island Sound Ferry Study indicated that 200,000 vehicles per year presently desire to travel from eastern Nassau and Suffolk Counties on Long Island to New England. To handle this amount of traffic, more modern ferries, as well as improved terminal facilities are needed on both sides of the Sound. It is recommended that such improvements be made at a site more easily and directly accessible than the present location. A location in close proximity to the railroad station and intercity bus lines would be optimum, provided adequate parking areas for ferry users can be found in the same location.

Government and the aviation industry predict a continuous increase in air travel in the foreseeable future. Aviation plays an important role in the movement of people to and from this region. At the state level there has been a widespread acceptance that major improvements in the Connecticut airport system are desirable.

A. AIRCRAFT LANDING FACILITIES IN THE REGION

In order to develop a regional airport system, it is necessary to determine the ability of the present airports to serve anticipated demands. The following facilities are located within Southeastern Connecticut:

Trumbull Airport, Groton (Public)
Lakeside Airport, Griswold (Private)
New London/Waterford Airport, Waterford (Private)
Colchester Airport (Rankle Field), Colchester, (Private)
Ski's Landing Area, Colchester (Private)
Gardner Lake Airport, Salem (Private)
Gallup Farm, Voluntown (Private)
Camp Grasso, East Lyme (Military)
Stone Ranch, East Lyme (Military)
Mackin's Field, Voluntown (Private)
Colchester Heliport, Colchester (Private)
Butler Heliport, New London (Private)
Norwich Heliport, Norwich Industrial Park (Private)
Poquonock River Seaplane Landing, Groton (Public)
Island Cove (Pachaug Pond) Seaplane Landing, Griswold (Private)

B. AIR CARRIER FACILITIES [This term applies to an airport used regularly by scheduled air carriers.]

Trumbull Airport is the only air carrier airport in this region. It is located in the Town of Groton one mile south of U.S. Route 1 between the Poquonock River and Baker Cove as shown in Figure 69. The airport is a state owned and operated facility on 480 acres of level land located 10' above mean sea level. The main runway is 5,000' in length by 150' in width. This runway has a northeast and southwest orientation and is the instrument runway at the airport. The east-west runway is 4,000' in length by 150' in width, as is the northwest and southeast runway. (See Figure 69.)

Principal buildings located at the airport consist of a terminal, administration building, a fire and crash building and three hangars. In addition, there are various other buildings that are leased for warehouse, office, repair and garage use.

1. Role of Trumbull Airport. The current role of Trumbull Airport is that of air carrier airport and general aviation airport. Its general aviation function accommodates corporate, air charter, instructional, rental and military operations, which together were estimated to account for about three-fourths of the total aircraft movements in 1971. Its air carrier function provides direct flight service in the short-haul category.

In 1971 the commuter aircraft accounted for 1/4 of the total aircraft movement at the airport. The market area of the commuter service is principally the Southeastern Connecticut Planning Region, with 94% of the passenger departures originating within this region.

2. Existing Trends. Table 49 presents data on air carrier flights to and from Trumbull Airport for 1970 and 1974. The data shows an increase of 63% in total aircraft movements, but an 8% decline in passenger use during this period. Cargo shipments also

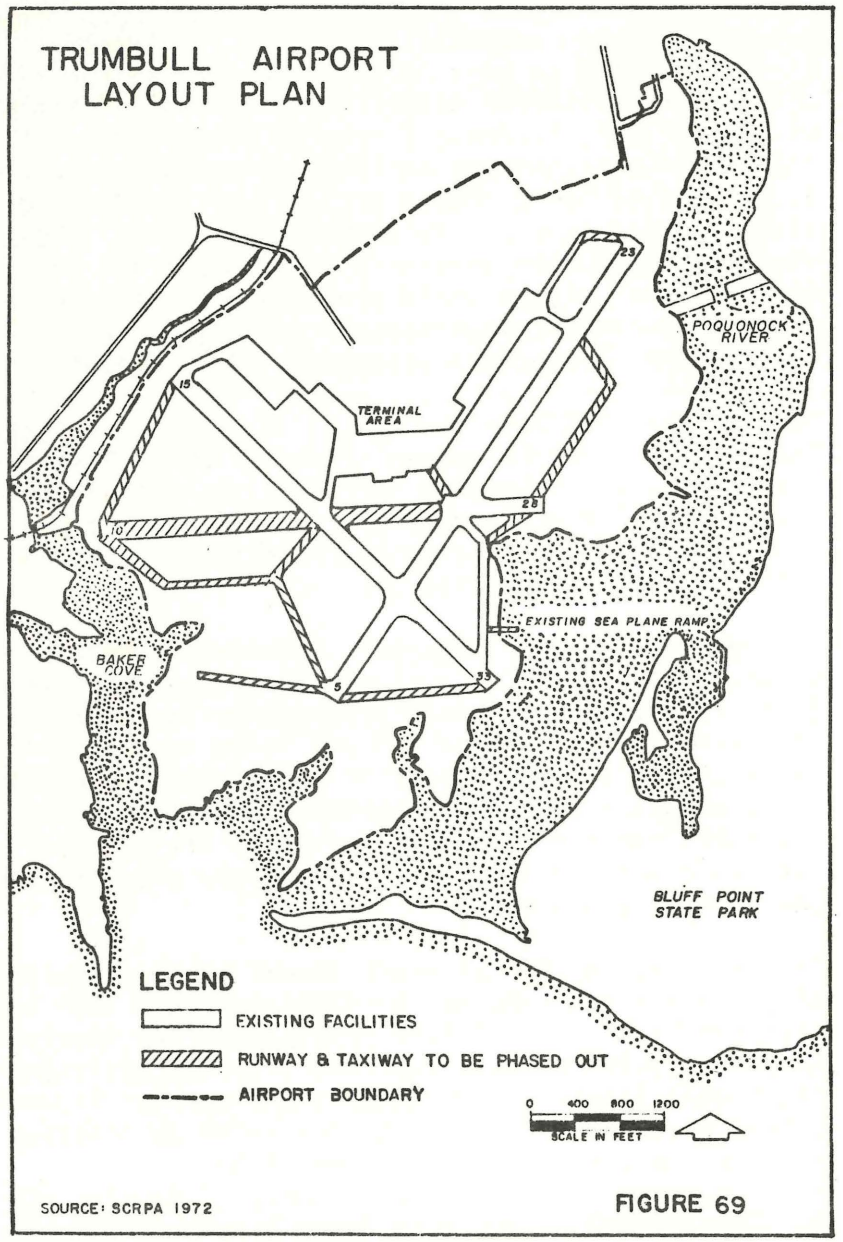


FIGURE 69

TABLE 49

SUMMARY OF AIR CARRIER ACTIVITIES
TRUMBULL AIRPORT - 1970 AND 1974
(Certified and Commuter Service Only)

	1970	1974
Total Aircraft Movements	9,192	15,008
Total Passengers Served	93,679	85,970
Tons of Cargo Handled	424	242

Source: Connecticut Department of Transportation, Bureau of Aeronautics.

declined 43% overall during the same five years.

3. Origin and Destination of Trumbull Airport Passengers. In 1972, in response to the growing concern of area residents over the state's plans to improve facilities at Trumbull Airport, SCRPA and the Groton Planning Office jointly studied the economic and environmental impact of the airport and the improvement plans on the region. As a part of that study, a survey of passengers was conducted. [For more information about Trumbull Airport and passenger characteristics, see THE IMPACT OF TRUMBULL AIRPORT, SCRPA and the Groton Planning Office, 1972.]

Outbound Trips. According to the survey, 59.2% of the outbound passengers originated their trip in Groton and 35.2% in the remainder of the Southeastern Connecticut Region. 3.5% were from other regions of Connecticut and 2.1% from Rhode Island. About half of the total outbound passengers were flying for business reasons.

15.2% of the trips were destined for Washington, D.C. and 13.3% for Virginia. Generally, the limit of direct flight service out of Trumbull was up to 400 miles. Passengers traveling longer distances were required to change planes.

Inbound Trips. Of the inbound passengers, 54.5% listed Groton as their destination. 38.4% were bound for other parts of this region, while the remaining 7.1% were destined to other regions of the state, to Rhode Island or to Massachusetts. Almost half of the total inbound passengers were flying for business purposes.

18.5% of all inbound passengers originated their trips in Washington, D.C. As was the case with outbound flights, 62.6% of all inbound passengers were required to change planes during their trip.

A major finding of the survey was that the market area for Trumbull Airport is basically Southeastern Connecticut. 94.4% of all outbound trips originated and 92.5% of inbound trips had their final destination in this region.

4. Future Use of Trumbull Airport. The chances of increase in the market area of Trumbull Airport in 1990 are unlikely due to other competing airports in Rhode Island and Connecticut. So we assume that the market area for Trumbull Airport will remain confined to Southeastern Connecticut. This means that the passengers and cargo activity of the airport will be limited to the amount of population and economic growth within the region.

Historically, Southeastern Connecticut's population growth has been at a moderate pace. From 1950 to 1960 the rate of growth was 27.7% and between 1960 and 1970 the increase was 22.9%. The non-agricultural employment increase in 1960-70 decade was 26.3%, or slightly faster than the pace of population growth. No major economic development boom is expected in this region in the foreseeable future.

Future passenger estimates were made for Trumbull Airport in 1969 as part of a statewide plan for airport needs. [AIRPORT FACILITIES PLAN FOR THE STATE OF CONNECTICUT, Frederic R. Harris Associates, 1969.] The 1980 forecasted use was 250,000 and was projected to 614,000 in 1990. These projections have been since revised downward by CONNDOT, resulting in estimates of 175,000 passengers in 1980 and 430,000 in 1990. Viewed in the light of SCRPA population projections and the past trends in passenger use of Trumbull Airport, these estimates appear inflated.

To meet the CONNDOT projections, at least one of two things would have to occur: (1) the Trumbull Airport market area would have to increase substantially beyond Southeastern Connecticut, or (2) the rate of airport use by the residents of this region would have to increase dramatically.

As regards use, in 1970 there were 124 commercial passenger enplanements at Trumbull Airport for every 1,000 residents in Southeastern Connecticut. This compares with a ratio of 343 per 1,000 residents for the state as a whole. By 1990 the CONNDOT forecast could be met only by a rate of 1,218 enplanements per 1,000 population. Such increases are clearly unlikely, especially in view of reduced usage during the last five years.

The decrease in air passenger travel at the Trumbull Airport of 82% at the end of 1974 over 1970 indicate that the Harris and CONNDOT projections for Trumbull Airport are too high. Under the present constraints and trends there is a reasonable chance that Trumbull will achieve a slight upward trend with an improvement in the national and regional economy.

By 1990 Trumbull could experience a rate of 300 commercial passengers per 1,000 persons in the region, as stated in the 1972 SCRPA/GPO study on the impact

of Trumbull Airport. This would mean a 54% increase in passengers between 1980 and 1990, compared with an expected 28% increase in the region's population during this period. This would result in 137,500 passenger movements by 1980 and 212,000 by 1990.

5. Evaluation of Previous Cargo Forecasts. Future air cargo volumes are even more difficult to anticipate than passenger volumes. The factors which influence air cargo volumes depend on the type of industrial activity in the region and the cargo handling facilities available at Trumbull.

In spite of enormous projected increases in cargo handling, the actual volume of air cargo at Trumbull Airport decreased by 42.9% between 1970 and 1974. There could be various reasons for this. One is stagnant economic conditions during this period in this region and in the nation as a whole. Another reason could be competition from ground transportation. Finally, changes in the characteristics of goods produced in this region can certainly affect air cargo volumes.

The conclusion in the 1972 SCRPA/GPO study that this part of the state is not likely to produce high value, light weight or perishable products (which are especially suited to air freight) in the foreseeable future, appears more valid today in light of the air cargo trends of the last five years.

6. Evaluation of Previous General Aviation Forecasts. General aviation includes all civilian flying except commercial air carrier.

The Harris study forecasts a total of 90,000 general aviation movements at Trumbull in 1980 and 128,250 in 1990. In 1974, actual movements reached almost 60,000 aircraft. There is a possibility that Trumbull may reach the forecasted general aviation traffic volumes by 1980 and 1990.

Little information is available on the general aviation activity at other facilities in this region. However, it is assumed that the general aviation airport in the Norwich-Preston area proposed in the 1969 State Airport Plan will not be built by 1990. The Waterford-New London Airport and Lake Front Airport in Griswold should continue to meet most of the region's general aviation needs through 1990.

7. Evaluation of Previous Military Aircraft Movement Forecasts. The Harris study forecasted that in 1970 Trumbull would handle 5,054 military aircraft movements, and it was assumed by the study that these movements would remain constant. However, actual movements at Trumbull were almost 8,000 in 1974.

The Harris estimate was low due to the unanticipated expansion in the National Guard aircraft repair operation at Trumbull which increased military movements sharply. However, it is assumed that the increase in movements will level off at about 9,000 movements by 1980.

8. Evaluation of Existing Facilities at Trumbull Airport. The 1972 SCRPA/GPO study of the Airport evaluated the adequacy of the terminal, cargo-handling facilities, auto parking spaces, and other aircraft operational, repair and maintenance facilities. All of these were found to be more than adequate to handle expected use, except that passenger loads within the terminal may exceed recommended Federal Aviation Administration standards during peak holiday movements. Runway 5-23, the instrument runway at Trumbull, has a load-bearing capacity of 113,000 pounds, far in excess of its present use.

In view of the above, no major improvements to Trumbull Airport should be made until a comprehensive development plan for the airport is completed. (Such a plan study is presently awaiting state funding.) The plan should reflect the future general aviation needs of all of Southeastern Connecticut and should consider the potentials of other existing airfields in the region for playing a role in meeting those needs.

APPENDIX

SUGGESTED IMPROVEMENTS ON STATE HIGHWAYS

Route	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
1	Groton	Minor Drainage	Fishtown Rd. to Sharon Rd.	0.3	65	3
1	Groton	Safety & Widening	Fort Hill Bk. to Allyn St.	2.5	1,680	1
1	Groton	Signal Geometry Lane Rearrangement	Depot Road	-	24	2
1	Groton	Signal Revisions & Channelization	Vicinity South Road	-	16	2
1	Groton	Ped. Activated Signal	Wayne Road	-	10	2
1	Groton	Walk Light	Drozdyk Dr.	-	4	2
1	Groton	Geometric Rev.	Vicinity Elm - West Main St.	-	35	3
1	Groton	Lane Arrangement	Vicinity New Town Rd Rt. 117	-	1	3
1	Groton	Stopping Lane	Vicinity Drozdyk Dr.	-	N.A.**	2
1	Groton	Stopping Lane	Vicinity Vergennes Court	-	N.A.	3
1	Groton	Stopping Lane	Vicinity Bel-Aire	-	N.A.	3
1	Groton	Stopping Lane	Down Town Mystic	-	N.A.	2
1	Groton	Traffic Operations (Signal)	Vicinity I-95 to Mystic	-	N.A.	1
1	Stonington	Sidewalk	Jn. 645 to South of Green Heaven Rd.	1	200	1
1	Stonington	Sight Line	Jn. 645 to South of Green Heaven Rd.	-	50	2
1	Stonington	Traffic Light	Jn. No. Main Street	1	10	1
1	Stonington	Sight Line Ver.	Jn. I Hewett Road.	1/4	20	2
1	Stonington	Sight Line & Geometrics	Jn. Rt. 27	-	50	1
1	Stonington	Geometrics	Jn. Rt. 2	-	100	2
1	Stonington	Traffic Light	Jn. Rt. 2	-	5	1
1	Stonington	Various Traffic Operatis	Town of Stonington	Entire Length	N.A.	2
1A	Waterford	Ped. Walkways Over Bridges	Various bridges in Town	100 feet	15	2
1A	Waterford	Various Traffic Operations	New London Town Line to Rt. 156	1.00	290	1
1A	Waterford	Modernize Intersections	At Spithead Rd. & Cross Rd.	-	TO	1
1A	Waterford	Modernize Intersections	Jn. Niantic River Road	-	7	1
2	Bozrah Norwich	Upgrade Expressway	W/O Rt. 32 to Ramps at West Town St.	0.4	6,900	2
2	Norwich	Curbing	Water Street Parklets	1/25	25	3
2	North Stonington	Widening Realignment	Vic. Jn. Rt. 201 south to Town Line Stonington	-	N.A.	1
2	Preston	Traffic Lights	Intersection 117	-	N.A.	1
2A	Preston	2-Lane Highway Construction	From Ct. 12 Ely to CT .2	2.4	3,400	2
2A	Preston	Sharp Curve	Vic. Harris Fuller Rd. to Vic. Paquetanuck Cove	1/2	N.A.	2

* Rating 1 to be undertaken within 1 to 2 years. Rating 3 to be undertaken within 5 to 10 years.
Rating 2 to be undertaken within 2 to 5 years.

** N.A. = Not Available.

Route	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
2A	Preston	Reconst. of Bridge	Paquetanuck Cove	-	N.A.	3
12	Norwich	Drainage	Boswell Ave. North of Tannery, Sec. II, Barnes St. to Berkley Rd.	0.15	N.A.	2
12	Norwich	Rev. of Geometrics	North End Central Ave.	-	5	1
12	Norwich	Rev. of Geometrics	South End Central Ave.	-	5	1
12	Norwich	Signalization	Intersection Eighth St.	-	5	1
12	Norwich	Sidewalks	Laurel Hill	-	33	2
12	Preston-Ledyard	Widening Bridge	Vic. Town Line Preston-Ledyard	-	N.A.	2
12	Ledyard	Climbing Lane	Vic. North of Military Hwy. Intersection	60	N.A.	1
12	Ledyard	Traffic Lights	Jn. Rt. 214	-	5	1
12	Ledyard	Add South Bound Climbing Lane For Trucks	Intersection Long Cove Rd.	1 1/4	80	1
12	Ledyard	Turning Lanes	Intersection Long Cove Rd.	-	22	1
12	Ledyard	Widening	Vic. of Dow Chemical	1/8	50	1
12	Groton	Widening	North of Crystal Lake Rd. to Town Line of Groton	3/4	450	1
12	Groton	Lane and Signal Rev.	Vic. Toll Gate Rd.	-	15	1
12	Groton	Sidewalks	Toll Gate Rd. to Crystal Lake Rd.	1.27	56	1
12	Groton	Stopping Lane	Vic. Lake Rd.-Gungywamp	-	N.A.	3
12	Groton	Stopping Lane	Vic. Nautilus Rd.	-	N.A.	3
12	Groton	Traffic Operations	Coordination of Traffic Signals	-	N.A.	1
16	Colchester	Reconst. Widening	Vic. Pease Road	1/2	30	2
16	Colchester	Sight Lines	Entire Length to Town Line	-	35	3
16	Colchester	Reconst. Grades, Widening	Entire Length	-	200	3
16	Colchester	Traffic Light	Jn. Bulkley Hill Rd.	-	5	1
27	Stonington-Groton	Widening & Sharp Curves	Vic. Jerry Brown Rd. to Rt. 184	1 1/2	400	2
32	Franklin	Widening	Pound Rd. to Smith Corner	1 1/2	200	2
32	Franklin	Sight Line	Intersection Pound Rd.	-	30	2
32	Franklin	Widening	Thompson Rd. to Intersection of Rt. 207	1 1/2	200	1
32	Franklin	Intersection Sight Line	Vic. Whippoorwill Hollow Rd.	-	30	1
32	Franklin	Intersection Reconst.	Jn. 207	-	50	1
32	Franklin	Warning Signal	Jn. Meeting House Rd.	-	5	1
32	Norwich	Curbing Sidewalk	Vic. Chelsea Parade	1/8	N.A.	3
32	Norwich	Relocation (Designate New London Tpke. as Rt. 32)	Vic. New London Tpke. to Montville Town Line	3 1/2	N.A.	1
32	Montville	Traffic Operations	Entire Length	-	N.A.	1
32	Montville	Improvement of at Grade Crossings	0.1 Mile North of Rt. 163	-	25	1
32	Montville	Realignment	South of Rt. 163 to North Jn. Crescent St.	0.4	1,306	2
32	Montville	Spot Improvements	South of Norwich Town Line Jn. Road to United Nuclear	1/4	15	1

SUGGESTED IMPROVEMENTS ON STATE HIGHWAYS, cont.

Route	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
32	Montville	Traffic Signals	Intersection of Pink Rd. and Vic. Midway Shopping Center & McDonalds	2	10	1
32	Waterford	Upgrade Divided Highway to Expressway	Vic. Rt. 693 to I-95	3.5	N.A.	3
32	Waterford	Various Traffic Operations	Vic. Rt. 693 to I-95	3.5	N.A.	1
49	Voluntown	Sharp Curve	Vic. Hedge Pound Rd.	0.25	N.A.	3
49	North Stonington	Widening, Realignment	Vic. Babcock Rd. to Norwich Town Line	-	N.A.	3
49	North Stonington	Widening, Realignment	Rt. 184 to Babcock Rd.	-	N.A.	1
51	East Lyme	Resurfacing (Note: 1 1/2 w/o 161 be resurfaced first)	Dean Rd. to Old Lyme Town Line	1.7	55	3
52	East Lyme-Waterford	Modernize Interchange	Intersection I-95	-	N.A.	2
52	Waterford	Add Ramp	Vic. Old Colchester Rd. off No. on South	-	40	2
52	Waterford	Remove toll	Town of Montville	-	N.A.	2
78	Stonington	New Two-Lane Highway	From I-95 Ely to Proposed Pawcatuck River Bridge	1.8	3,000	1
82	Norwich	Widening, Traffic Operations Improvement	Washington Square to Rt. 52	2	6,000	1
82	Norwich	Sight Line	Maple and Anne Street	-	1.5	2
82	Montville	Realignment	n/o Caroline Rd. to 1/2 Mile Westerly	.5	150	2
82	Salem	Widening	Hagan Rd. to Intersection Rt. 85	.25	50	1
82	Salem	Pedestrian Walkways Over Bridge	Bridge Over Harris Brook Vic. Salem Four Corners	-	15	2
85	Colchester	Minor Drainage	Vic. Intersection West Rd.	-	N.A.	1
85	Colchester	Geometrics	Intersection Rt. 35A	-	N.A.	2
85	Salem	Adjust Time Traffic Light	Vic. Four Corners	-	.2	1
85	Salem	Signing	Vic. of Horse Pond	-	2	1
85	Salem	Resurfacing by Vender in Place	Vic. Four Corners	1/12	N.A.	2
85	Montville-Waterford	Major Widening	Vic. Jn. Rt. 82 to I-95	10.5	N.A.	2
87	Franklin	Traffic Signal	Vic. C.V. R.R. Crossing	-	3	1
95	Waterford	Upgrade Expressway	Rebuild "On Ramp" From Waterford Parkway South	0.09	35	2
95	Waterford	Upgrade Expressway	Rebuild Rt. 85 Interchange	-	100	3
95	New London	Multi Use	Gold Star Bridge	-	N.A.	2
95	New London	Installation of Down Pipes	Bridge	-	N.A.	1
95	Old Lyme-Waterford	Barrier Rail	Sect. 4 at Cross Rd. in Waterford	-	N.A.	3
95	East Lyme-Waterford	Upgrade Expressway	Vic. Rt. 52 to Vic. Rt. 85 Expressway	1.3	13,040	3
95	Waterford	Upgrade Expressway	From Vic. Cross Rd. Ely to 700 ft. E/O Waterford-New London Town Line	2.4	21,770	3
95	East Lyme	Upgrade Expressway	Vic. Town Line East Lyme, Vic. Rt. 52	5	N.A.	3
95	East Lyme	Barrier Rail	Sect. 3 at Rt. 51 in East Lyme	-	N.A.	2

Route	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
97	Norwich	Intersection Improvement	At the Intersection With CT 169 (South Jn.)	-	39	2
97	Sprague	Sharp Curve	North of Norwich Town Line	1/4	1	1
97	Norwich	Geometrics	Intersection Baltic Rd., Bridge St., Occum Rd., Canterbury Tpke.	-	5,000	1
117	Ledyard	Widening	Groton Town Line North	-	N.A.	2
117	Ledyard	New Alignment	Church Hill Road to Rt. 164	3	N.A.	1
117	Groton	Lane Rearrangement	Intersection Rt. 1	-	N.A.	1
117	Preston	Geometrics Rev.	Vic. Intersection Lincoln Park Rd.	-	N.A.	1
138	Lisbon	Realignment	W/O to E/O Rt. 169	0.5	523	1-3
138	Lisbon	Rest Area	Site Not Located	-	N.A.	3
138	Sprague	Realignment	Vic. Rt. 97 to Hanover Versailles Rd.	2 1/2	N.A.	2
138	Griswold	Traffic Light	Intersection Rt. 164 and 138	-	N.A.	1
138	Voluntown	Caution Light	Intersection 138 and Beachdale Ave.	-	N.A.	1
149	Colchester	Reconstruction	Full Length to Town Line	-	N.A.	3
156	East Lyme	Reconstruction	From 0.4 Mile E. of CT 161 Ely to West Abut. of the Proposed Niantic River Br.	0.4	2,640	1
156	Waterford	Relocation	From E. Abut. of Prop. Niantic River Br. Ely to 0.1 Mile East of Gardners Wood Road	0.9	5,200	3
156	East Lyme-Waterford	Traffic Operations	W/O Rt. 1A to East Lyme Town Line	-	N.A.	2
163	Montville	Realignment	Lynch Hill Rd. to N/O Maple Ave.	0.6	653	3
163	Montville	Realignment & Reconstruction	Jn. Rt. 32 to Rt. 52	.5	100	2
165	Preston	Site Lines	Vic. Intersection Miller Rd.	1/4	N.A.	1
165	Preston	Rev. Geometrics	Intersection Rt. 164	-	N.A.	1
165	Preston	Sharp Curve	Vic. West of Radler Rd. to Intersection Old Stucket Tpke.	2	N.A.	3
169	Lisbon-Norwich	Realignment	South of Rt. 52 to Rt. 97	3.0	1,500	3
184	Groton	Sight Line	Vic. Candlewood Rd.	-	14	1
184	Groton	Sight Line	Vic. Rogers Rd.	-	10	1
184	Stonington	Geometrics	Jn. Rt. 201	-	50	2
201	Griswold	Reconstruction	Rt. 12 to Vic. Mary St.	0.4	653	2
201	Griswold	Realignment	Vic. Mary St. to Vic. Rt. 52	1 1/2	N.A.	3
201	Griswold	Realignment	Vic. Rt. 52 to Vic. Rt. 138	3 1/2	N.A.	3
201	Griswold	Sidewalks	Rt. 12 to Manroe St.	3/4	N.A.	3
201	North Stonington	Realignment	Rt. 2 Stonington Town Line South	-	N.A.	3
201	North Stonington	Realignment	South of Griswold Town Line	1/2	N.A.	3
207	Franklin	Reconstruction & Realignment	East of and West of Jn. Rt. 32 to Town Line	1/2	75	3
213	New London	Major Drainage	Sect. 1 From Vic. of Elm St. to the Vic. of Vauxhall St.	0.4	5000	1
213 85	New London	Major Drainage	Sect. 2 From Vic. of Sixth Ave. to the Vic. of Ct. 213	0.6	0	2
213	New London	Sidewalks	City Area	2	N.A.	1

SUGGESTED IMPROVEMENTS ON STATE HIGHWAYS, cont.

Route	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
213	New London	Widening	Vic. Broad St. to Vic. Vauxhall St.	-	55	2
213	New London	Drainage	Vic. Willetts Ave. to Vic. Bank St.	-	1000	3
213	Waterford	Site Lines Sharp Curves	500' w/o Dimmock Rd., 3700' to 800' east of Ledyard Rd.	-	296	1
214	Ledyard	Spot Improvements	Between Rt. 12 and Rt. 117	1 1/2	1000	1
215	Groton	Geometrics	Vic. Brook St.	35	N.A.	3
433	Montville	Widening, Drainage	Vic. Rt. 32 to State Park	1 1/2	150	2
600	Sprague	Realignment Curves	Versailles Rd. to Rt. 138	1 1/2	N.A.	1
610	Franklin	Reconstruction	From Rt. 32 to 207	2	300	3
645	Stonington	Sight Line	Jn. Farm House Rd.	-	250	2
645	Stonington	Minor Drainage, Spot Improvement	Complete Length	Spots	50	2
693	Waterford Montville	Resurfacing by Vendor-In-Place	Rt. 32 to Rt. 52 Both Dir.	-	147	3

SUGGESTED IMPROVEMENTS ON URBAN SYSTEMS
FIRST PRIORITY PROJECTS
FOR THE SOUTHEASTERN CONNECTICUT REGION

Route	Town	Improvement Type	Limits of Improvements	Estimated Cost (In Thousands of Dollars)
Bride Brook Road	East Lyme	Safety Improvements	I-95 To Rt. 156 South 1.3 Miles	530
Rt. 156 (Main Street)	East Lyme	Const. of Approaches to Niantic River Bridge	West End of the Proposed Niantic River Bridge, 3000 Vic. Smith Ave.	2,500
Rt. 117	Groton	Partly Safety & Partly Reconstruction	Rt. 184, Northerly	566.4
Rt. 649	City of Groton	Rev. of Geometrics	Intersection Eastern Point Vic. Electric Boat	50
Rt. 649	City of Groton	Signalization	Intersection Benham Road and Rainville Ave.	25
Rt. 649	City of Groton	Geometrics	Intersection Bendge St. and North St.	50
Military Highway	Groton	Complete Reconstruction to Improve Safety	Crystal Lake Road to Grove Ave. 1 1/2 miles	1,280
Intersection	Ledyard	Traffic Light	Long Cove/Military Highway	5
Long Cove Road	Ledyard	Widening & Safety Improvements	Between Military Highway & Rt. 12	25.3
Jerome Road	Montville	Realignment & Safety Improvements	Maple Ave. to Waterford Town Line	100
Rt. 85 & 213, Broad & Coleman St.	New London	Drainage	Coleman St. Vic. Elm St. to Vic. Vauxhall St., Broad St. Sixth Ave. to Coleman St. to Ledyard St., Ledyard St.-Cedar Grove Rd. to Vic. I-95	4,543.6

NOTES:
1. List does not indicate any sequence of priority.
2. All the towns have committed to pay their share 15% of the project cost on town roads.
3. Towns have also promised to get the design done by town forces or the consultants with a reasonable notice.
4. Certain projects are already at design stage on State and Town roads.

Route	Town	Improvement Type	Limits of Improvements	Estimated Cost (In Thousands of Dollars)
Urban Systems Network	New London	Signing & Permanent Pavement, Marking Installation	City of New London	70
New London Turnpike	Norwich	Satefy Improvements & Widening	Town St. South to West Thames St.	1,050
Union Square	Norwich	Off-Street Parking	Parking Facility to Accommodate Approximately 75 cars	300
Urban Systems Route Network	Norwich	Various Traffic Operations	City of Norwich, Downtown Area	193
Jerry Brown Road	Stonington	Widening & Drainage	Pequot Sepos Rd. To Rt. 27, 1 mile	400
Rt. 27	Stonington	Drainage, Traffic Operations Row Improvements	For Rt. 1 to I-95, 1 mile	400
Rt. 213	Waterford	Improvement of Site Lines & Sharp Curves	500' West of Dimmock Rd., 3700' to 800' East of Ledyard Rd.	296
Spithead Road	Waterford	Improvement of Sharp Curves	4000' South on Rt. 156	320
Rt. 1A	Waterford	Various Traffic Operations	New London Town Line To Rt. 156	

SUGGESTED IMPROVEMENTS ON URBAN SYSTEMS
SECOND PRIORITY PROJECTS
FOR THE SOUTHEASTERN CONNECTICUT REGION

Route	Town	Improvement Type	Limits of Improvements	Estimated Cost (In Thousands of Dollars
Society Road	East Lyme	Construction of Unimproved Road	Southwest Portion Vic. I-95 & Dean Rd., 85 Miles	350
Gungywamp Road	Town of Groton	Reconstruction & Alignment	From Rt. 184 West to Navy Housing 1 1/8 Miles	630
Cow Hill Road	Town of Groton	Reconstruction	State Portion Only, 1/2 Mile	480
Tower Avenue	Town of Groton	Rebuilding	Airport Loop South Rd., 1 1/2 Mile, Route 1 to Thomas Road	431
Kitemaug Road	Montville	Realignment	Massapeag Road to Orchard Drive	35
Montauk Avenue	New London	Replacement of Substandard Signal Installation	Intersection Montauk Ave. & Willetts Avenue	40
Jefferson Ave.	New London	Widening	Jefferson Ave., Vic. Bank St. to Vic. Coleman St.	350
Coleman St.	New London	Widening	Coleman St. Vic. Broad St. to Vic. Vauxhall St.	55
Glenwood Ave.	New London	Bridge	Glenwood Ave., Vic. Alewife Cove	300
Vauxhall St.	New London	Channelization	Vic. Vauxhall St. Extension & Overpass	35
Pequot Ave.	New London	Channelization & Traffic Control	Vic. Howard St., Willetts Ave. & Shaw St.	70
City Street	New London	Signalization Warrant Study	Vic. I-95 Coleman St. at Baynet St.	2
Montauk Avenue	New London	Bridge	Montauk Ave., Vic. Penn Central	
Dunham Street	Norwich	Reconstruction	West Main St. East to West, Thames St.	1,050
Asylum Street	Norwich	Reconstruction	New London Tpke. South to West Main St.	540
Bloomingdale Road	Waterford	Improvement of Site Line-Curves	From Hunts Brook Cross Culvert East, Approximately 1300' to Old Mill Road	104
Cross Road	Waterford	Widening Traffic Control, Reconstruction of Overpass	From Rt. 85 South 7050' to 120' South of Waterford Parkway	1,032

SUGGESTED IMPROVEMENTS ON URBAN SYSTEMS
THIRD PRIORITY PROJECTS
FOR THE SOUTHEASTERN CONNECTICUT REGION

Route	Town	Improvement Type	Limits of Improvements	Estimated Cost (In Thousands of Dollars)
High Rock Road	Town of Groton	General Improvement	Packamuk Rd. To Thomas Rd. 1/2 Mile	66
Buddington Road	Town of Groton	General Improvement	Rt. 1 Northerly to I-95, 7/8 Mile	288
Toll Gate Road	Town of Groton	General Reconstruction	Rt. 184 to Rt. 12, 1 Mile	336
Noank Ledyard Road	Town of Groton	Reconstruction	Florence Drive to Flanders Road 1 1/2 Miles	504
High Street	Town of Groton	Reconstruction	Rt. 1 to Starr St., 1/2 Mile	252
Poquonock Road	Town of Groton	Reconstruction	Rt. 1 to Trail's Corner, 1/2 Mile	120
Walker Hill Road	Town of Groton	General Improvement	Rt. 12 to Grove Ave., 1/8 Mile	84
Sandy Hollow Road	Town of Groton	Reconstruction	Noank Ledyard Rd. to High St. 1 1/8 Mile	218
Meridan St.	Town of Groton	Reconstruction	City Line to Rt, 1, 1/2 Mile	
Crystal Lake Road	Town of Groton	Widening	Military Highway to Rt. 12, 1/4 Miles	122
Connecticut Rt. 27	Town of Groton	Widening & Improvement of Curves	Rt. 184 to Town Line of Stonington 3/8 3/8 Miles	80
Fish Town Road	Town of Groton	Widening & Drainage	Rt. 1 to Rt. 215, 1 1/4 Miles	336
Thomas Road	Town of Groton	Widening	Town Line City of Groton to High Rock Rd.	75
Ocean Ave.	New London	Drainage	Vic. Willetts Ave. to Vic. Bank St.	1,000
Pequot Avenue	New London	Drainage	Vic. Green's Harbor Beach	10
F.A. Urban Systems Route	New London	Surveillance Systems & Equipment	New London Police Dept.	10
Connector Broadway & Greenville	Norwich	New Connector Construction	Broadway & Greenville	530
Hewitt Road	Stonington	Widening, Resurfacing, Drainage	Complete Road, 1 Mile	400

SUGGESTED IMPROVEMENTS ON OFF SYSTEMS ROADS

Street	Town	Improvement Type	Limits of Improvement	Distance	Rough Estimate of Cost in Thousand $	Priority Rating*
River Road	Colchester	Reconstruction of Bridge	Bridge on River Road over Dickenson Creek	-	35	1
Holmes Road	East Lyme	Widening Curves Safety	Intersection Upper Walnut Hill Road, Westerly	1600'	105	1
Scott Road	East Lyme	Widening & Improve Curve	Vic. Pole #657 No. Route 51	2000'	130	2
Scott Road	East Lyme	Widening & Improve Curve	Vic. South of Intersection Pattagansett & Scott Road	1500'	97.5	3
Ross Hill	Lisbon	New Construction	Extension	1000'	50	1
Ross Hill	Lisbon	Reconstruction	Entire Length	2.4 miles	54.96	2
Old Colchester Road	Montville	Reconstruction	Vic. Intersection Laurel Point Dr. Northwesterly	1 mile	40	1
Old Colchester Road	Montville	Reconstruction	Culvert Oxoboxo	-	20	1
Pendleton Rd.	Preston	Reconstruction	Entire Length	2600'	104	2
Cooktown Rd.	Preston	Reconstruction	Entire Length	6000'	240	3

SUGGESTED IMPROVEMENTS ON TOWN ROADS

Street	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
Stockhouse Rd.	Bozrah	Reconstruction, Widening Curbs	Rt. 608 to Rt. 87	1 1/2	N.A.	1
Gager Rd.	Bozrah	Reconstruction of Bridge	-	-	20	1
Town Road	Bozrah	Relocation of Road	Gager Road	1/2	50	1
Old Hebron Rd.	Colchester	Rebuild w/Drainage & Sidewalks	Rt. 615 Broadway to Town Line	1 1/2	500	1
Chestnut Hill Rd.	Colchester	Rebuild w/Drainage	Rt. 616 to Rt. 2	1/4	65	1
Bulkley Hill Rd.	Colchester	Rebuild	Rt. 16 - Drag Strip	2 1/4	550	1
Town Roads	Colchester	Replace & Improve Signing	Town Roads	65	15	1
Town Arteries	Colchester	Strip Centerline	Major Town Arteries	20-25	N.A.	1
Halls Hill	Colchester	Sidewalks	Length of Halls Hill	3/4	N.A.	1
Upper Pattagansett	East Lyme	Improve Vertical & Horizontal Curvature	From Rt. 51 to Scott Rd.	2.76	875	2
Mitchell Dr.	East Lyme	Bituminous Concrete	From Attawan Rd. to cul-de-sac	.15	4.5	2
Black Point Rd.	East Lyme	New Sidewalk	From McElaney Dr. South Westerly 1000 ft.	0.2	10	1
Lovers Lane	East Lyme	Reconstruct, Widen & Improve Horizontal & Vertical Alignment	From Dean Rd. to Rt. 51	1.1	360	3
Bridebrook Rd.	East Lyme	Reconstruct, Widen & Improve Horizontal & Vertical Alignment	From Society Rd. to Rt. 51	1.1	360	2
Avery Rd.	Franklin	Improvement of Curve	-	500	6	1
Champion Rd.	Franklin	Improve Drainage	1/2 Mile South of Orindy Rd.	1/2	5	1
Bethal Rd.	Griswold	Widening of Curvert	Rill Brook, Burton Brook	-	35	1
Industrial Park Access Rd.	Groton	Complete Construction	Rt. 117 to Flanders Rd.	1	1200	1
East-West Hwy.	Groton	Complete Const.	Rt. 215 to Defense Access Hwy.	3.4	8000	1
Poquonnock-High Rock Rd.	Groton	Signal & Geometric	-	-	32.2	1
Mystic Side-walks	Groton	Pedestrian Safety-Sidewalks	Several Streets	1.7	56	1
Fort Hill Sidewalks	Groton	Pedestrian Safety Sidewalks	Several Neighborhood Streets	1.8	275	1
Vineger Hill Rd.	Ledyard	Minor Widening, Realignment, Resurfacing	Long Cove Rd. to Whale Head Rd.	1 1/2	30	2
Whale Head Rd.	Ledyard	Minor Widening, Realignment, Resurfacing	Rt. 214 to Rt. 12	2 1/2	50	1
Bushnell Lane	Lisbon	Major Widening	From 138 Northerly	1	100	1
Chesterfield Rd.	Montville	Realignment of Sharp Curves	From Old Colchester Rd. Westerly to Rt. 85	5 curves	75	1

* Rating 1 to be undertaken within 1 to 2 years.
Rating 2 to be undertaken within 2 to 5 years.
Rating 3 to be undertaken within 5 to 10 years.
** N.A. = Not Available.

SUGGESTED IMPROVEMENTS ON TOWN ROADS, cont.

Street	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
Moxley Hill Rd.	Montville	Widening & Re-alignment of Curves	Rt. 52 to Old Colchester Rd. Westerly	1/2	40	2
Broad St. & McKinley Ave.	Norwich	Lower Grade, Resurface Bump	-	50	2	1
City Wide	Norwich	Improvement of Existing Signs (Substandard)	City Wide	-	12	2
Town St. at E. Town St., Elm St.	Norwich	Horizontal Sight-Line Problems	-	-	7	2
Boswell Ave. at Hickery St.	Norwich	Horizontal Sight Line Problems	-	-	3.5	2
Butts Lane, Intersec. Town & Washington St.'s	Norwich	Redesign	-	-	-	1
Entire City	Norwich	Tree Planting, Shrubs, Refuse Receptacles, Benches, Planters	-	-	10	2
Ross Road	Preston	Major, Minor Widenings	Vic. South of Int. Doolittle Rd.	1/4	N.A.	1
Witch Metal Rd.	Salem	Reconst. of Bridge One-Way	Vic. of 1500' west of 85	-	60	2
Jerry Brown Rd.	Stonington	Sharp Curve	Vic. of Mistucket Ave. & Jerry Brown Rd.	-	25	2
White Rock Rd.	Stonington	Bridge	Reconstruction	-	350	1
Lantern Hill	Stonington	Intersection	Vic. Majorie St.	-	25	2
Inland Road	Sprague	Realignment & Widening	Rt. 138 to Federal Paper Board	1	75	1
Hanover-Versailles	Sprague	Realignment & Widening	From Hanover Baltic Rd. So. 6/10 of Mile	.6	58	1
Church Hill	Sprague	Spot Improvement	1 Mile west of Rt. 207	1/4	15	1
Cross Road	Waterford	Modernize Inter-change	Rebuild Intersection at Waterford Parkway North	Intersection	8	1
Niantic River	Waterford	Modernize Inter-change	Relocate Old Niantic River Rd. to Form a "T" Intersection	Intersection	2	1
Bloomingdale	Waterford	Removal of Advertising Signs	From Old Mill Rd. South to Hunts Brook	.3	130	1
Shore Drive	Waterford	Minor Drainage	At Beach St. and Parkway	.09	5	1
Niantic River	Waterford	Minor Widening & Drainage	From Tenth Ave. North 600'	.1	12	1
Old Mill	Waterford	Bridge Approaches & Super Structure Repairs	At Hunts Brook	.15	62	1
Niantic River	Waterford	Modernize Interchange	At Rt. 1-A	Intersection	3	1
Brown Road	Voluntown	Widening	Intersection Congdon Rd. to Rt. 49	2 1/2	N.A.	1
Wylie School	Voluntown	Side Line Improv.	Town Road	5	N.A.	1
Campmill Road	Voluntown	Widen Sharp Curve	Town Road	1/4	N.A.	2
Forge Hill Rd.	Voluntown	Widen Sharp Curve	1/8 Mile near Intersection North Shore Road	1/8	N.A.	2

PARKING FACILITIES

SUGGESTED IMPROVEMENTS

Street	Town	Improvement Type	Limits of Improvement	Rough Estimate of Cost in Thousand $	Priority Rating*
Old Hartford Rd.	Colchester	Constructing Parking Lot	Town Garage	5	2
95 & 117	Groton	Gravel Commuter Parking Lots	Provide Approx. 50 Parking Spaces at the Intersection of Rts. 95 and 117	30	2
614	Groton	Gravel Commuter Parking Lots	Vic. Intersection Rt. 614 & I-95, for 50 spaces	N.A.	1
184	Groton	Gravel Commuter Parking Lots	Vic. Intersection Rt. 184 & Rt. 117 for 30 spaces	N.A.	1
52, 169	Lisbon	Gravel Commuter Parking Lot	Vic. Intersection 52, 169	5	3
161, 85	Montville	Gravel Commuter Parking Lot	Jn. 161 and Rt. 85	5	1
95	New London	Gravel Commuter Parking Lots	Provide Parking Spaces at the Intersection of Rt. 95 & State Pier Road	100	1
2A	Preston	Gravel Commuter Parking Lots	East of the Ct 12 Intersection	27	1
85, 82	Salem	Gravel Commuter Parking	Vic. Four Corners, 40 spaces	50	1
11	Salem	Gravel Commuter Parking	Interchange Witchmeadow Rd. 40 spaces	8	3
49	Stonington	Gravel Commuter Parking Lot	Provide 30 spaces Intersection Rt. 49 & I-95	N.A.	2
95, 85	Waterford	Gravel Commuter Parking Lots	Provide Approx. 50 Parking Spaces at the Intersection of Rts. 95 & 85	20	1
693	Waterford	Gravel Commuter Parking Lots	Provide Approx. 30 Parking Sapces at the Intersection of Rts. 32 & 693	N.A.	2

SUGGESTED IMPROVEMENTS ON HIGHWAY BRIDGE REPLACEMENT ON STATE HIGHWAYS

Route	Town	Improvement Type	Limits of Improvement	Distance in Miles	Rough Estimate of Cost in Thousand $	Priority Rating*
156	East Lyme	Replace Bridge & Approaches	Niantic River Bridge #01397	.1	5500	1
608	Bozrah	Bridge Superstruct. Replacement	Bridge #01633 Over Yantic River & Immediate Approaches	.1	85	1
12	Griswold	Highway Bridge Over Railroad	PCRR #00666	-	3500	3
32	Norwich	Highway Bridge Over Railroad	CVRR #00929	-	1500	3
32	Norwich	Highway Bridge Over Railroad	Over PCRR #932	-	91	3

REGIONAL BIKE WAY SYSTEM

SUGGESTED PROGRAMS

Route/Street	Limits of Improvement		Distance in Miles	Rough Estimate of Cost	Priority Rating*
Route 1	Route 649-Groton	Depot Road-Groton	0.28	N.A.	2
Route 649	Benham Road-Groton	Route 1-Groton	4.45	-	2
Benham Road	Route 649-Groton	Mitchell Street-Groton	0.84	-	2
Mitchell & North Streets	Benham Road-Groton	Bridge Street-Groton	0.96	-	2
Bridge Street Fairview Ave. & Grove St.	North Street-Groton	Bliven Street-Groton	0.69	-	2
Bliven Street	Grove Ave.-Groton	Approach Ramp to Thames River Bridge-Groton	0.12	-	2
Thames River Bridge & Approaches	Route 1A-New London	Bliven Street-Groton	1.4	-	1
Route 215	Brook St.-Groton	Route 1-Groton	3.44	-	2
Route 1A	Route 213-New London	Thames River Bridge New London	1.4	-	1
Route 2A	West end of Mohegan-Pequot Bridge-Montville	Route 12-Preston	0.68	-	1
Route 433 & Fort Shantok Park Roads	Route 32-Montville	Route 2A at west end of Mohegan-Pequot Bridge-Montville	1.5	N.A.	1
Route 32	West Town St.-Norwich	Regional Boundary	-	N.A.	2
West Town St.	Route 32-Norwich	Town Street-Norwich	1.8	N.A.	2
Town Street	West Town St.-Norwich	Route 32-Norwich	0.55	N.A.	2
Route 32	Route 433-Montville	Town Street-Norwich	4.5	-	2
Route 2A	Route 12-Preston	Route 2-Preston	2.81	-	2
Route 2	Routes 2A & 117-Preston	Route 201-North Stonington	7.40	-	2
Route 213	Route 156-Waterford	Route 1A-New London	6.62	-	2
Route 156	Route 51-East Lyme	Route 213-Waterford	-	-	2

BUS TRANSIT CAPITAL IMPROVEMENT PROGRAM

	FY 1976-77		FY 1977-78		FY 1978-79		FY 1979-80		FY 1980-81		TOTAL	
	#	$	#	$	#	$	#	$	#	$	#	$
Buses and Related Equipment												
Buses (50-pass.)	3	213,000	24	1,704,000	-	-	-	-	-	-	27	1,917,000
Buses (25-pass.)	11	484,000	-	-	-	-	1	44,000	-	-	12	528,000
Registering Fare Boxes	14	4,200	24	7,200	-	-	1	300	-	-	39	11,700
Two-way Radios	14	23,800*	24	28,800	-	-	1	1,200	-	-	39	53,800
Grab Bar Sets	14	1,400	24	2,400	-	-	1	100	-	-	39	3,900
Service Trucks	2	14,000	-	-	-	-	-	-	-	-	2	14,000
Buildings and Related Equipment												
Const. Main Storage & Maintenance Facility, New London	-	1,012,000	-	-	-	-	-	-	-	-	-	1,012,000
Acquisition of Second Storage Facility at Norwich	-	85,500	-	-	-	-	-	-	-	-	-	85,500
Renovation of Norwich Facility	-	225,000	-	-	-	-	-	-	-	-	-	225,000
Hoists & Special Equipment	-	60,000	-	-	-	-	-	-	-	-	-	60,000
Coin Counters	2	4,000	-	-	-	-	-	-	-	-	2	4,000
Steam Cleaners	2	1,400	-	-	-	-	-	-	-	-	2	1,400
Bus Washer	2	60,000	-	-	-	-	-	-	-	-	2	60,000
Vacuum Cleaners	2	1,200	-	-	-	-	-	-	-	-	2	1,200
Field Equipment												
Bus Shelters	15	45,000	10	30,000	5	15,000	5	15,000	5	15,000	40	120,000
Bus Stop Signs	600	30,000	400	20,000	-	-	200	10,000	-	-	1200	60,000
Benches	40	12,000	40	12,000	20	6,000	20	6,000	20	6,000	140	42,000
Other Items												
Spare Parts	-	20,000	-	10,000	-	10,000	-	10,000	-	10,000	-	60,000
TOTAL		- 2,296,500		- 1,814,400	-	31,000	-	86,600	-	31,000	-	4,259,500

* Includes two transceivers for main offices @ $3,500 each.

WATERWAYS SYSTEM

SUGGESTED PORT FACILITY IMPROVEMENTS

Towns	Improvement Type	Limits of Improvement	Rough Estimate of Cost	Priority Rating*
Various	Dredging of Channel	Thames River 25' to 33' Channel	N.A.	3
New London	Terminal Facilities	Ferry Terminal in New London	N.A.	1
New London	Expand Docking Facilities at New London State Pier	Expand To Allow More Than Two Ships At State Pier At One Time	N.A.	1
New London	Add Liquid Storage Facility At State Pier	Add Tank Storage Facilities To Allow Liquid Movement Thru State Pier	N.A.	1
New London	Expand Warehousing At State Pier	Limited Warehousing Restricts Flow At Pier	N.A.	2

RAIL SYSTEM

SUGGESTED IMPROVEMENTS

Towns	Improvement Type	Limits of Improvement	Rough Estimate of Cost	Priority Rating*
Groton to Norwich	Commuter Service Improvements	Provide Inter-City Rail Service For Commuters	N.A.	3
New London to Norwich	Commuter Service Improvements	Provide Inter-City Rail Service For Commuters	N.A.	3
East Lyme to Groton	Commuter Service Improvements	Provide Inter-City Rail Service For Commuters	N.A.	3
Stonington to New London	Commuter Service Improvements	Provide Inter-City Rail Service For Commuters	N.A.	3
New London	High Level Platform	New London	N.A.	1
New London	Renovation Rail-road Station	New London	N.A.	1
Stonington	High Level Platform	Mystic	N.A.	1
East Lyme	Construct Waiting Station	Opposite Pennslyvania Ave. to Facilitate Commuter Train Stop	50,000	2
Groton	Elimination of at Grade Crossings	Groton School St. Crossing	N.A.	2
Groton	Elimination of at Grade Crossings	Tower Avenue Crossing	N.A.	2
Groton	Elimination of at Grade Crossings	Meridian Street Crossing	N.A.	2
Groton	Elimination of at Grade Crossings	Poquonnuck Road Crossing	N.A.	2
New London	Elimination of at Grade Crossings	From Vic. of Shaw's Cove to the Thames River	-	2
New London	Elimination of at Grade Crossings	Various Locations	-	3
Waterford	Elimination of at Grade Crossings	Eliminate at Grade Crossing Waterford Minor LA. Crossing	N.A.	2
Stonington	Elimination of at Grade Crossings	Eliminate at Grade Crossings Stonington Broadway & Latimer Rd. Crossing	N.A.	2
Stonington	Elimination of at Grade Crossings	Eliminate at Grade Crossings Stonington Wamphassuc Crossing	N.A.	2
Stonington	Elimination of at Grade Crossings	Eliminate at Grade Crossings Stonington Walters & Freemans Crossing	N.A.	2
Stonington	Elimination of at Grade Crossings	Eliminate at Grade Crossings Stonington Palmer St. Cross.	N.A.	2

MULTI MODAL TERMINALS

SUGGESTED IMPROVEMENTS

Town	Improvement Type	Limits of Improvement	Rough Estimate of Cost	Priority Rating*
New London	Intermodal Transfer Facility	Site to be Determined Upon Completion of Additional Study	-	1
Colchester	Intermodal Transfer Facility	Site to be Determined Upon Completion of Additional Study	60	3
Groton	Intermodal Transfer Facility	Site to be Determined Upon Completion of Additional Study	60	2
Norwich	Intermodal Transfer Facility	Site to be Determined Upon Completion of Additional Study	60	1

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